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A SYSTEM

OF

MIDWIFERY.

Published by
JAMES MACLEHOSE AND SONS, GLASGOW,
Publishers to the University.

MACMILLAN AND CO., LONDON.

London, . . . *Hamilton, Adams & Co.*
Edinburgh, . . . *Douglas & Foulis.*
Dublin, . . . *Fannin & Co.*

MDCCCLXXXVIII.

A SYSTEM OF

MIDWIFERY

INCLUDING THE DISEASES OF PREGNANCY AND THE PUERPERAL STATE

B47

BY

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VOLUME II.

FOURTH EDITION.

GLASGOW:
JAMES MACLEHOSE & SONS,
Publishers to the University.
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CHAPTER XXIII.

HÆMORRHAGE BEFORE DELIVERY.

"Unavoidable" and "Accidental" Hæmorrhage.—PLACENTA PRÆVIA; *Central and Lateral: Original Idea as to the nature of: Views of Rœderer and Rigby.—Causes of Placental Presentation.—Symptoms: Hæmorrhage before and during Labour: Examination from the Vagina.—Occasional Termination by Expulsion of the Placenta, with Cessation of Hæmorrhage.—Symptoms and Termination of the "Lateral" Variety.—Treatment: General Measures: Use of the Plug or Tampon: Evacuation of the Liquor Amnii by Puncture of the Membranes or Placenta.—Turning in Placenta Prævia: Passage of the Hand through the Placenta at one time Practised: Usual Method of Operation.—The Bi-Polar Method.—Extraction of the Placenta.—Separation of the Placenta.—General Conclusions as to Treatment.* ACCIDENTAL HÆMORRHAGE; *more serious than is generally supposed.—Site of the Placenta.—Symptoms.—Treatment.—Use of Styptics in both Forms of Hæmorrhage.*

WHILE hæmorrhage prior to delivery is, as has just been shown, the rule in cases of premature expulsion of the ovum—a rule which indeed, at certain periods of abortion, admits scarcely of an exception—it is otherwise with labour at the full term. With the exception of the trifling hæmorrhagic discharge constituting, at the termination of the first stage, what midwives call the "show," any loss of blood which precedes the birth of the child when mature, is in its nature abnormal. In practice, a certain number of cases are found to occur, in which, in consequence of abnormal conditions, a serious loss of blood takes place before birth, so serious as in many instances to imperil the life both of the mother and her child. All cases of hæmorrhage before labour do not, however, as will clearly be shown in the sequel, depend on the same cause; and, in consequence, the treatment applicable to each varies in relation to the cause which produces it. Dr. Rigby, in his admirable essay on this subject, published more than a hundred years ago, divided

cases of hæmorrhage which occur in the last three months of gestation into those which are "Unavoidable" and those which are "Accidental." Of the two, the former is the more important, and is familiarly known under the name of Placenta Prævia; while the accidental form is due to the operation of causes which are similar in their nature, and in their mechanism, to the discharges which occur in abortion.

Placenta Prævia.—This, which is otherwise termed Placental Presentation, implies that the placenta, instead of occupying its usual site in the neighbourhood of the fundus uteri, is the lowest or most dependent part of the uterine contents, and occupies, wholly or partly, the passage through which the child has to pass. When it is attached to the entire circumference of the cervix, it is called "complete" placenta prævia, or Placenta Centralis; while, if it is adherent to a portion only of this area, it is usually designated as "partial" placenta prævia, or Placenta Lateralis. Such peculiar situation of the placenta necessarily involves its detachment from the subjacent uterine tissues with which it is in contact. This may take place, either gradually, in proportion as the lower segment of the uterus expands in the latter months of pregnancy, or, more suddenly, when the mechanism of the first stage of labour tears asunder those attachments, in the course of the uterine contractions which effect dilatation of the os. In either case, the hæmorrhage from gaping vessels is, in the strictest sense of the term, "unavoidable," as it is impossible for the child to be born without hæmorrhage of the most alarming description. There are, on this account, few of the dangers of midwifery which the accoucheur dreads more, and Naegele was probably right when he said "that there is no error in nature to be compared with this, for the very action which she uses to bring the child into the world is that by which she destroys both it and the mother."

The idea entertained by the ancients, and which (with the exception of those of Portal and Gifford) was taught in all works on midwifery down to about 1766—when Rœderer's Elementa Artis Obstetriciæ was published—was that, in these cases, the placenta was originally attached at its usual site, and that it only fell down to the lower part of the uterus after it had been entirely separated. Rœderer, in the work above referred to, gave as complete and succinct a description of placental presentation as is to be found in any modern work on obstetrics, and drew, moreover, a distinction between central and lateral implantation of the placenta. The work of Rigby, published a few years later, but which contains no reference whatever to the observations of Rœderer, is more familiar to English writers, and certainly was the first to bring a correct knowledge of the subject

under the notice of English obstetricians, whatever may be the weight of the author's claim to originality.

Causes.—The causes of placental presentation are but little understood. The fertilized ovum generally grafts itself, as is well known, upon some portion of the uterine mucous membrane, not far distant from the orifice of the Fallopian tube along which it has descended. It has been presumed that, as the connection between the chorion and the decidua is—prior to the development of the placenta—continuous over the whole of the contiguous surfaces, the actual site of the placenta may correspond to any point in the circumference of the ovum. The tumid and convoluted condition of the mucous membrane which obtains during menstruation, and for some days afterwards, is obviously well suited to the arrestment of the fertilized ovum, a body already endowed with independent vitality, and prone to adhere to any surface from which may be derived the pabulum on which the maintenance of that vitality must necessarily depend. Exceptional circumstances may, however, occur to permit of the descent and ultimate escape of a fertilized ovum; and we may, therefore, infer that the ovum may, in any such case, be arrested near the cervix, and there go through the series of physiological changes upon which the formation of the embryo depends. The occurrence of extra-uterine pregnancy shows that contact with the membrane which is specially prepared for its reception is by no means essential to development of the ovum. There is nothing, therefore, extravagant in the assumption that it may take root at a point of the uterine mucous membrane distant from the site which it ordinarily selects. It has even been held that the impregnation of the ovum may take place as low in the uterus as the cervix; and, if it be so, this will no doubt serve to explain the phenomenon in question. But, even if we suppose the ovum to be impregnated before its arrival in the uterus—which is doubtless the usual course—there are many special circumstances which may account for its occasional gravitation towards the cervix before contracting adhesions. If, for example, its descent is, relatively to the menstrual period, later than usual, it may find the mucous membrane no longer tumefied and convoluted to the same extent as before; and there can be no doubt that a smooth and flat surface would be more likely to permit of such gravitation than the other conditions of the membrane already referred to as characteristic of a menstrual period. The probable result of such a case would be loss of the ovum; but it is at least possible that it might yet be arrested in its descent, and graft itself upon a surface to which it is accidentally contiguous, as when it falls upon the peritoneum in abdominal pregnancy. All such speculations are, however, merely theoretical, for it must be confessed that,

in so far as the etiology of placenta prævia is concerned, nothing definite is known.

Symptoms.—In the early months of pregnancy, there are no symptoms which enable us to recognise the condition in question; and, if hæmorrhage should take place, it will probably be followed by abortion, in the course of which nothing would occur likely to direct our attention to the peculiar nature of the case. A sudden attack of hæmorrhage, occurring at any period more advanced than that at which abortions generally take place, more profuse than usual, and for which no definite cause can be assigned, should always excite our suspicion, as it must necessarily demand our attention. Such hæmorrhages, dependent upon placental presentation, usually occur in the course of the last three months of pregnancy; and the nearer the pregnancy is to its natural termination, the more profuse is the discharge likely to be. If this symptom should be of earlier occurrence than usual, the quantity will probably be slight, and, under favourable circumstances and judicious treatment, will speedily cease. After an uncertain interval, and often at what would have been the next menstrual period, the symptoms will, however, return with increased violence. Repeated hæmorrhages of this kind, becoming progressively more alarming, ultimately attract attention and call for assistance.

If at this stage we make an examination, we shall probably find that the os and cervix are somewhat peculiar to the touch. This peculiarity consists in a doughy feeling, due to the unusual thickness of the cervix, which is necessarily permeated with large vessels for the placental circulation. And this feeling is further exaggerated by the presence of the placenta itself between the finger and the presenting part, depriving the latter of its feeling of firmness and resistance. If the os is sufficiently dilated to permit the passage of the finger, the characteristic spongy tissue of the placenta may alone be felt; or if the case should be a lateral and not a central one, we may feel the edge of the placenta projecting at one side of the os uteri, and, possibly, the bag of membranes with the presenting part of the child at the other. If the flooding has been very severe, we may feel the detached surface of the placenta, which is lacerated and stringy to the touch; and we may even discover, in some instances, when the separation has been extensive, a portion of the organ protruding into the os, or through it into the vagina. In presentations of the breech or shoulder, which usually remain high in the pelvis, the detection of placenta prævia is more difficult, partly on this account, and partly because the placenta can less easily be felt than when it is between the finger and the resistant structures of the cranium.

There is another class of case, in which no symptoms whatever occur until the uterine contractions at the commencement of labour interrupt, for the first time, the continuity of the utero-placental vessels. Here the gush of blood is sometimes so fearful as to cause immediate syncope, and, in some cases, the death of the woman before assistance can reach her. Hæmorrhage before labour, therefore, has this advantage,—that it enables us to recognise the nature of the case at a period sufficiently early to adopt precautionary measures, with a view to the patient's safety. From the commencement of labour, the symptoms in the two varieties are identical. Each successive pain tends still further to the separation of the placenta from its cervical attachments, and consequently to increase the hæmorrhage, so that, up to a certain stage, the more advanced the labour, the more imminent is the danger; and, if left to themselves, such cases almost necessarily prove fatal. It is here that the important practical distinction is drawn which enables us, even without a digital examination, to distinguish between Unavoidable and Accidental hæmorrhage, and which led Rigby to adopt this useful classification. In the former, remissions may occur between the pains, but with each contraction the flow of blood is increased, while, in the latter, the descent of the head bars the egress of blood, the source of the discharge being higher in the uterus, as will be shown when we come to notice this special variety of flooding.

It has been said that hæmorrhage some time before labour is more likely to occur in cases of central than of lateral placenta prævia; and if we were to draw an inference from the anatomical relation of the parts, we would be quite prepared to accept the correctness of this conclusion. Practical experience has, however, shown that we cannot depend on this, and that many cases of central implantation present no symptoms whatever until these are developed by the occurrence of labour. It sometimes, ~~though rarely~~, happens that the effect of the uterine contractions is to separate the placenta, either from its cervical attachments or from its entire uterine connection, so that the hæmorrhage is comparatively trifling. In some of these instances, the detached placenta has been propelled into the vagina, and the fœtus, then descending so as to press upon the orifices of the gaping vessels, has protected the woman, from that time onwards, from the further effects of alarming hæmorrhage. This has suggested a mode of treatment of these cases which will be mentioned at the proper place, and which is not without strenuous advocates at the present day. Another rare termination of central placenta, of which cases have been recorded by Portal and others, is the birth of the child *through* the placenta. A case of this

nature occurred in the practice of Mr. White of Heathfield in Sussex, and is given by Rigby. The placenta was "centrally attached to the os uteri, when, in consequence of two or three powerful pains, the head was forced through, tearing it quite across. The child was born dead, but the mother did well." Such terminations of placenta prævia are so rare, that not only do we place no reliance on them, but we do not even allow them to enter into our calculations in determining the mode of procedure which is to be adopted. It has even happened that in these cases children have been born alive, but it is obvious that the life of the child must, almost of necessity, be sacrificed. This is a further reason for not trusting to nature in the circumstances now under consideration.

More confidence may, at times, be placed in the efforts of nature, when the case is a partial one, and the placenta situated laterally with respect to the os. As the placenta may be implanted upon any part of the internal surface of the uterus, a considerable variety of cases of partial placenta prævia may present themselves. In those cases in which the placenta spreads over a large portion of the cervix—and it has been observed that it is generally of greater superficial size than when it is developed at the fundus—the same treatment which is held to be applicable to central cases will be indicated. But, in the instances in which the bulk of the placenta is above the cervix, and a small portion only is implanted on that part, it is quite possible that, although labour may be ushered in by profuse flooding, the head may be permitted to descend, when it will act as a plug, and the natural powers will effect a safe delivery as regards both mother and child. It should be remembered that the expression "central" merely implies attachment to the whole circumference in the region of the internal os. It does not in any way involve the idea of a placenta so situated that its margin is on all sides equidistant from the os. Far from that being the case indeed, it may be assumed that, in almost all cases, there is a point in the circumference of the placental margin which is nearer to, and can be more easily reached by, the finger of the operator. There are indeed, in all probability, many central cases which present conditions almost identical with those of the lateral variety, the membrane on one side being reached by the finger with the greatest ease. It is well to bear this in mind in reference to the question of treatment. As is the case with regard to many other of the accidents of midwifery, there seems to be a proclivity to the recurrence of placenta prævia in those who have once been the subject of it; and another and stranger fact has also been noticed by Rigby, Saxtorph, Naegele, and others, viz., that at certain periods this accident seems of more frequent occurrence

than at others. The last-named authority, in remarking on this, states "that in some years, placental presentation was so frequent that it seemed as if it were almost epidemic."

Treatment.—The occurrence of hæmorrhage in the last months of pregnancy is of itself sufficient to warrant, and indeed to demand, an immediate vaginal examination. Should the existence of the symptoms already detailed reveal the presence of the placenta at the os, the future management of the case becomes at once a matter involving no little anxiety. It has already been remarked that the earlier the period of pregnancy at which flooding first takes place, the less is the immediate risk to the woman. The treatment of such cases differs but little, as Rigby well remarks, from that of an ordinary case of abortion. The indications, in fact, are the same—viz., to stop the discharge, and allay any disposition to uterine contraction. At the same time, no effort must be spared to prevent, if it be practicable, further separation of the placenta.

Nothing is, perhaps, of such importance as *rest*. The patient should be placed in a bed which is as hard as is compatible with comfort. With the view of keeping her cool, the temperature of the room must be attended to, and the bedclothes should be light. The bowels may be managed by gentle saline laxatives or enemata, and the patient should not be permitted to raise her shoulders; nor, for a certain time after an attack, should she ever be allowed even to move in bed more than is absolutely necessary. The food at first should be of the lightest possible description, such as milk, arrowroot, and the like, and should be given cool. Such restricted regimen cannot be persevered in for any length of time, so that we must soon introduce soups, fish, chicken, and more nourishing material generally into the dietary. The use of stimulants, except in so far as they may be necessary in the stage of depression, consequent on severe flooding, must be forbidden. But when the frequency and amount of the hæmorrhage is at this stage great, the opinion is steadily gaining ground, that by bringing on premature labour we do what is best in the interests both of mother and child.[1] The probable result of hæmorrhage, in placenta prævia prior to the seventh month, is, as has been said, abortion. When gestation is further advanced, and the fœtus has reached the period of viability, we endeavour to avert premature delivery as long as is possible, in order to give the child the best possible chance.

When hæmorrhage and vaginal examination have revealed the nature of the case, at any time during the last three months of gestation, we should inform the patient and her friends of the certainty of a

[1] See Dr. Greenhalgh's paper, Obstetrical Transactions, vol. vi.

recurrence of the flooding sooner or later. The number of the attacks, and the period which may elapse between them, are points on which we dare not venture an opinion. In one case, the flow may be almost continuous, or have remissions only; and, in another, there may be but one or two attacks, and these not seldom corresponding to menstrual periods. But the great peril, in every case, lies in this—that we can never foresee the moment when a torrent of blood may be poured out in such abundance, that the life of the woman is placed in instant jeopardy, and may be sacrificed before assistance can reach her. It is on this account that we should seriously consider the propriety of inducing premature labour, but if we resolve to delay, particular directions must be given, in order that no time be lost in summoning assistance. It is, moreover, of the highest possible importance that a skilful nurse should be in constant attendance, to whom the accoucheur may give instructions as to the method of plugging—the materials for which should be kept prepared and constantly at hand.

The Plug.—The use of the vaginal plug or tampon, as applicable to the treatment of abortion, has already been described, and the proceeding in this case is precisely similar. The object of plugging, if practised before labour has commenced, is simply to prevent the flow of blood, without there being any ulterior object, as regards further operative procedure, in view. This is effected partly by preventing the external flow, and partly by compressing the placenta between the plug and the presenting part of the child, and thus artificially damming up the source from which the blood has escaped. Although, as already, remarked, the sponge is to be preferred on various grounds, it, and the coagulated blood which accumulates in its interstices, are so prone to decomposition, that it cannot well be retained beyond a few hours. Many, indeed, reject the sponge absolutely on these grounds. In such cases, therefore, as it may seem advisable to maintain compression of the placenta for a longer period, it may be better to plug with a kite-tail tampon composed of pads of lint, tow, or some other similar substance; or, better still, by an india-rubber bag, which, after its introduction, may be distended either with water or with air. Braun's *Colpeurynter* is a contrivance of this nature. The plug must not, however, be used rashly in those cases in which the hæmorrhage is as yet trifling, and, in which, consequently, we are justified in temporizing, in the hope of preserving the child; for experience, derived from the treatment of abortion cases, has clearly shown that the irritation of the plug is pretty sure, sooner or later, to excite uterine contraction. Where labour pains, however feeble, have already manifested themselves, or where the urgency of the symptoms precludes

the hope of conducting the case to maturity, this particular action of the plug is rather an advantage, as, by stimulating the uterine fibres, the os is more rapidly and effectually dilated. Astringents, local and general, have been tried in every possible way in these cases, but it must be confessed that their action is not even in the slightest degree to be depended upon—a result which will not excite wonder if the purely mechanical cause of the hæmorrhage be kept in mind.

When the flooding does not occur until labour has declared itself at the termination of pregnancy, or when, at any period, the hæmorrhage is so profuse, and the general symptoms so urgent, as to demand energetic action in the presence of a great emergency, our duty is to encourage contraction, and to complete delivery as soon as possible. With this object prominently in view, various modes of treatment have been recommended, to each of which it is necessary specially to advert. In a large proportion of the cases in which the os is as yet undilated to any extent, the only justifiable mode of procedure is to arrest the hæmorrhage by plugging, and, at the same time, to favour uterine contraction by every means at our command. Plugging is, however, as will be observed, in all cases of placenta prævia, a mere temporary expedient, which is employed with a view to ulterior proceedings.

Evacuation of the Liquor Amnii.—This is, beyond all doubt, a practice of great antiquity. Its object, in the present instance, is to develop uterine energy, so as to cause compression of the placenta between the child and the uterine wall, and, by these means, to reduce the risk of hæmorrhage. The cases to which this mode of procedure seems more particularly applicable are those instances in which the placenta is situated more or less laterally, or, in other words, those in which the membranes can be reached before the os has become dilated, and without much risk of rupture of tissue. Its use, however, has not been confined to such cases, but has been recommended and practised by Deventer, Deleurye, Smellie, and, more recently, by others, who, in cases of central implantation, puncture the placenta, by a trocar or otherwise, with the view of arresting the hæmorrhage. Rupture of the membranes is also applicable to all cases in which it is found expedient to induce premature labour, that is to say, if it can be effected with safety; but, if not, of course other means must be adopted to rouse the uterus to activity. Dr. Barnes says "the puncture of the membranes is the first thing to be done in all cases of flooding sufficient to cause anxiety before labour. *It is the most generally efficacious remedy, and it can always be applied.*" The italics are his, indicating the emphasis with which he makes the statement, but, in so far as our experience enables us to judge, we cannot endorse his assertion. And, moreover, we can-

not but think that such a procedure as he describes, viz., guiding a stylet or quill along the finger to the membranes, must necessarily cause, for a time at least, an increase in the bleeding in central cases, as it certainly must a violent though partial separation of the placenta in a part of its circumference. The contraction of the uterus may be further promoted by the action of ergot and the other oxytocics. Evacuation of the liquor amnii and the use of ergot are, it must be remembered, open to this objection, that by such treatment, the difficulty of the operation of turning is greatly increased, should that operation eventually be found necessary; but, if the operation for separation of the placenta is to be preferred, as is recommended by Dr. Barnes, this objection has no force.

Turning in Placenta Prævia.—The operation of turning, which will be more particularly described in another chapter, is that to which most modern authorities give the preference in the treatment of cases of placental presentation. So long as this operation is looked forward to as one suitable to an individual case, not only must rupture of the membranes not be practised, but every means should be adopted which is likely to preserve their integrity. We shall not here anticipate the details of the ordinary operation of turning, but notice only those modifications of the operation which are rendered necessary by the peculiar anatomical conditions of the case. Two methods have been suggested. That to which Dr. Rigby has lent the weight of his authority, consists in forcing the hand *through* the tissues of the placenta into the amnionic cavity, and then completing the operation in the usual way.

This procedure has been abandoned as dangerous, and for the most part impracticable, in favour of the second method, the origin of which is generally attributed to Portal. The hand, in this case, is to be passed, not through, but by the side of the placenta, choosing, if it be possible to ascertain the fact, that side to which the placental adhesions are least extensive. It is, as has been already said, very rare that the attachment is equal in extent all round; and, of course, if there be any point of the circumference to which the placenta is not adherent, that place should be selected for the passage of the hand. The usual precautions are to be adopted for preventing rupture of the membranes, and the hand is to be carried high into the uterus, between it and the membranes, until the situation of the feet is ascertained, when the fingers are thrust through them, a foot seized, and the operation completed in the usual way. During the course of this procedure—which is often easier of execution than under ordinary circumstances, owing to the relaxed state of the uterus, due to the hæmorrhage—the arm of the operator acts as a plug, which effectually restrains external hæmor-

rhage. When the foot is brought down into the vagina, the breech and trunk of the child forcibly compress the placental mass, and in this way one plug is replaced by another more efficient still. The action of the womb should be aided by an external bandage, or by firm pressure, at this period, over the fundus, and a full dose of ergot may be administered, with the view still further of ensuring efficient contraction. If the child is still alive, or if there is no evidence of its death (in which case we should act as if it were alive), delivery must be effected as rapidly as is consistent with the safety of the mother. With its birth, the critical period of danger will have passed, and the uterus will now contract firmly upon, and shortly expel, the mass of the placenta which is left behind.

When the accoucheur is summoned at the commencement of labour, on account of the alarming flooding, he will probably find that the os is not sufficiently dilated to permit of the operation of turning with a reasonable prospect of safety. His first duty at this stage is to arrest the hæmorrhage, until such time shall arrive as the condition of the parts may warrant him in proceeding to the operation. This can only be effected by the action of the plug, which is to be introduced in the manner above described. Or, what is more effectual still, strips of lint may be introduced, one after the other, through the speculum, as by this means the vagina can be more thoroughly packed. As the pressure of the plug is apt to interfere with the action of the bladder, it will be well to see that that viscus is empty before its introduction. A still more effectual method of plugging may at this stage be practised by means of the fiddle-shaped water bags, invented by Dr. Barnes. A certain amount of dilatation is necessary for the successful application of these; but if the os is of sufficient size to admit the point of the finger, it will then be practicable to pass a bag of small size. This may then be distended with water in the manner described by the inventor, and a firm elastic plug is thus formed, which serves the double purpose of preventing any escape of blood, and, at the same time, of mechanically dilating the os by a safe and graduated method of pressure. The exchange of the small bag for one of larger size may, after an hour or so, be effected without much risk, if the operator is dexterous; and, in this way, such dilatation of the os may be effected as will admit the passage of the fingers, and subsequently of the hand. But, whether we make use of the vaginal or cervical plug, the object is to dilate the os, with the view of subsequent operative procedure.

It is to be remembered that extensive dilatation of the os is by no means essential to the successful performance of the operation of turning. The method of combined external and internal manipulation,

which has already been referred to in the chapter on Transverse Presentations, and which will be more particularly described, affords a mode of procedure which is by no means difficult, and which is certainly safer to the mother. To effect this, the passage of one or two fingers through the os is all that is necessary; and, in so far as placenta prævia is concerned, we are convinced that this method is peculiarly applicable, and will ultimately, in a great measure, displace the more familiar operation.

"The conditions favourable for turning are," says Dr. Tyler Smith, "a dilated or dilatable state of the os uteri; 2 the retention of the liquor amnii, or 3 a moderately relaxed state of the uterus; 4 a pelvis of average capacity; 5 the absence of dangerous exhaustion, 6 or a temporary cessation of the hæmorrhage." Nothing is of greater importance than that the operation should be attempted as early as possible, for there can be no doubt that the great mortality which attends these cases is due, in no small degree, to an injudicious expectant treatment, while the precious moments pass during which alone we can save the patient's life and that of her child. It may sometimes be necessary, when the case does not come under our observation until this more advanced and critical stage, to delay the operation, and to plug until the woman is rallied by free stimulation from the state of incipient collapse into which she has fallen. In this, as in all other cases of prostration from hæmorrhage, brandy given along with opium will effect the object in view, as well perhaps as any other combination of stimulants which it is possible to prescribe. When, in such cases, the pulse and general appearance show that the woman has rallied, the operation may be commenced, and conducted with the special precautions which the circumstances demand.

In cases of lateral placenta prævia, the operation of turning is not usually required; but if, in such, the hæmorrhage is still alarming, after the head has descended so as to occupy a fully distended os, the labour may be completed by the application of the forceps.

Extraction and Separation of the Placenta.—It is proper to draw a distinction between these two operations, which were suggested by what has occasionally been observed as a natural termination of placenta prævia, viz., the birth of the placenta or its expulsion into the vagina in advance of the child, *with cessation of the hæmorrhage.* Imitating this, Drs. Wood, Radford, and Simpson tried—what had previously been done in a few cases—to separate and extract the placenta, in the hope of speedily arresting the hæmorrhage, and thus ensuring the safety of the mother. Simpson, with his usual indefatigable industry, collated a table, in which cases are given, showing the results to the

mother in instances of turning. Contrasted with this is another series of cases, in which the placenta was expelled naturally or removed artificially before the birth of the child. The following represents, in a tabular form, the results of his elaborate statistics:—

	Cases of Placenta Prævia.	Maternal Deaths.
Turning, ...	654 . .	180, or 27·48 per cent.
Extraction or Expulsion, .	140 . .	10, or 7·14 per cent.

Such an issue as is represented by these figures is by no means, however, a fair representation of the comparative risk attendant upon the two operations. On the contrary, by grouping together the cases in which natural expulsion had occurred with those in which the removal had been accomplished by operative interference, the value of the comparison is lost, as it must be evident that spontaneous expulsion is less likely to be attended with a fatal result than those cases in which the parts are torn asunder by an operation which, however gently performed, implies a rupture of tissue by violence, involving the integrity of large vascular trunks. Although the figures are to this extent unreliable, it must be admitted that the cases upon which they are founded show, quite clearly, that separation of the placenta, whether natural or artificial, is accompanied, in a large proportion of cases, by an abatement of the hæmorrhage and of the more alarming symptoms. "Paradoxical as it may appear," says Simpson, "there are sufficient grounds and facts for believing that, when the placenta is separated slightly and partially, the chance of fatal hæmorrhage to the mother is greater than when the disunion of the organs is entire and complete."

It would serve no good purpose to follow the discussion to which Simpson's views as to the source of the hæmorrhage in placenta prævia gave rise. These are essentially the same as were held by his predecessor, Dr. Hamilton, that the blood flowed not from the uterine, but from the placental orifices of the ruptured vessels, a point which, although of high physiological interest, must not divert our attention from the more important practical questions upon which it has but an indirect bearing. We must not omit to mention that the operation of extraction is, as regards the child, extremely unfavourable in its ultimate results—more so, certainly, than turning, if performed at the proper time. In this, also, Simpson's statistics are likely to mislead, if not carefully analyzed. Again grouping together indiscriminately cases of expulsion and extraction, he finds that in 141 cases the child was saved in 33, and, as the result as regards the child was not stated in a considerable number of the remaining cases, it may be assumed that the actual number of children born alive was somewhat larger than is

above stated. But here again the same source of fallacy comes into play, and, in point of fact, it is certain that the statistical results of spontaneous expulsion and artificial extraction should be carefully separated, otherwise the figures are very apt to encourage errors in practice. When the fœtus is born by the efforts of nature, it has often been found to be expelled by the same pain which brings the placenta into the world, or at least follows it within a very few minutes, a result extremely improbable in artificial extraction. Dr. Simpson's own tables point conclusively to this fact, and in those cases in which the interval between the birth of the placenta and that of the child was more than ten minutes, he gives but one instance, occurring in the practice of Mr. Perfect, in which the child was born alive. Unless then it could be proved that a speedy delivery of the child could be depended upon after extraction of the placenta, that operation cannot be looked upon with favour, in so far at least as the interests of the child are concerned.)

But, should we even resolve upon the extraction of the placenta, the difficulties of the case do not terminate with the completion of that operation. Thus we find that, of the entire number of 86 cases given by Simpson in his tables, delivery was effected by turning in 25 instances, and by other modes of operative procedure in 7, while in 9 the mode of delivery is not specified. This leaves 45 cases only in which the delivery was completed by the natural pains, and we may confidently conclude that, if we could separate the cases of spontaneous expulsion, the issue of the operative cases would appear still more unfavourable. The inference which was drawn from Simpson's elaborate papers on this subject, and the interpretation which indeed seemed to attach to them, was that the author wished to supersede the old operation of turning by that of artificial separation. We might think it necessary to say something more in refutation of such a conclusion, were it not that the practice has never commanded general support. And, moreover, a careful reperusal of Simpson's facts, arguments, and conclusions, seems very clearly to show that, whatever opinions may have been entertained by that distinguished accoucheur when he submitted his views to the Medico-Chirurgical Society of Edinburgh in 1844, those were materially altered before his death. This appears even more clearly from the Lecture Notes, by which the reprint of his selected obstetrical works, edited by Dr. J. Watt Black, is prefaced.

We shall now refer to the mode of Partial Separation, which has of late years received a considerable amount of support, and which is intimately associated with the name of Dr. Barnes. The effect of the uterine contractions, and consequent dilatation of the os, is, as he has

shown, to separate the placenta in concentric rings from below upwards, vessel after vessel being thus opened, and the hæmorrhage proportionally increased. So soon as the separation has reached a certain height, the passage of the head may become possible, while yet an amount of placenta sufficient to discharge the function of the organ may remain attached. Dr. Barnes maintains that the complete separation of the placenta as recommended by Simpson is impracticable. "In by far the greater number of cases," he says, "the placenta extends higher than the meridian of the uterus, often reaching the fundus. The fingers are not long enough to reach even half way towards the further margin of the placenta. The diameter of the placenta is nine or ten inches; the fingers will barely reach three inches. In the greater number of cases, therefore, in which the directions prescribed have been followed, the placenta has not been wholly detached, and the result, when successful, cannot be attributed to an operation which was not performed." Assuming this fact to be correct, and supposing, therefore, that to ensure *complete* separation of the placenta, the whole hand must be passed into the uterus, he adds that this operation "is even more severe than turning, which does not require the hand to be passed through the cervix." Here he obviously refers to the bi-polar method. There is, he infers, a zone or line around the lower part of the uterine cavity, *above* which spontaneous detachment and hæmorrhage do not occur, and *below* which alone separation and unavoidable hæmorrhage take place.

On this hypothesis, then, the real period of danger is that during which the placenta is being separated from the cervical zone, and Dr. Barnes maintains, with great confidence, that this is the mode of action in many of the cases which have been narrated of spontaneous cessation of the flooding, the real facts being misinterpreted by the observer. In a case which recently occurred in the experience of the writer, the facts observed seem strongly to corroborate the idea thus suggested, in regard to which he had previously been somewhat sceptical. A young woman, pregnant for the second time, had had several attacks of hæmorrhage prior to the expiry of her pregnancy. With the first labour pains another gush took place, and shortly after this, she was first seen and examined by him. He found the os sufficiently dilated to admit a single finger, and the placenta completely surrounding the orifice. During several successive pains it was observed that the quantity of blood for such a case was very trifling, and it was on that account resolved to leave the case for a time to nature, with the view of observing what course nature would adopt. Materials were prepared for plugging the moment this should seem to be necessary, and the

case was anxiously watched. Soon afterwards pains came on, of great violence and in rapid succession, but there was only one short period of about a minute and a half, during which the hæmorrhage was alarming, which suddenly ceased upon the rupture of the membranes. Upon an examination, the head was now felt descending, and the woman was shortly afterwards safely delivered of a living child. She made an excellent recovery.

Artificial Separation.—Whatever may be the method of treatment upon which it is resolved to act, the first difficulty generally is to effect the dilatation of the cervix with the least possible chance of hæmorrhage. Dr. Barnes, believing that the tardy separation of the placenta from what he terms the "orificial zone" of the uterus is the main cause of hæmorrhage, recommends that, if rupture of the membranes, which is his first procedure, should fail, we ought at once to separate the whole of that part of the placenta which is adherent to the zone in question. The details which he gives are as follows:—"Pass one or two fingers as far as they will go through the os uteri, the hand being passed into the vagina if necessary; feeling the placenta, insinuate the finger between it and the uterine wall; sweep the finger round in a circle, so as to separate the placenta as far as the finger can reach; if you feel the edge of the placenta where the membranes begin, tear open the membranes freely, especially if these have not been previously ruptured; ascertain if you can what is the presentation of the child before withdrawing your hand. Commonly some amount of retraction of the cervix takes place after this operation, and *often the hæmorrhage ceases.* . . . If uterine action return so as to drive down the head, it is pretty certain there will be no more hæmorrhage; you may leave nature to expand the cervix, and to complete the delivery. The labour, freed from the placental complication, has become natural." Failing this, he then advocates the use of his hydrostatic dilators, which at once expand the os and arrest the bleeding. After an hour or half an hour, the bag may be withdrawn, and if then the uterus remains inactive, with a continuance of the hæmorrhage, or if the presentation turns out to be transverse or otherwise abnormal, which is very common in placenta prævia, the operation of turning is then to be resorted to by the bi-polar method. On a total of 69 cases treated by Dr. Barnes on this principle, the percentage of maternal deaths was only 16·66.

The various methods above described may be conveniently epitomized for practical purposes in the following propositions, in which it is attempted to give its proper value to each:—

1. That the Evacuation of the Liquor Amnii is specially applicable to

cases of lateral or partial placenta prævia, to other cases in which the membranes can be easily reached, and to cases in which the fœtus is immature.

2. That Ergot and other oxytocics may be administered, but it is to be remembered that both these and evacuation of the liquor amnii act so as to render the operation of turning more difficult.

3. That Plugging is called for at various stages, and may be applied either in the vagina or in the os uteri. It is a mere temporary expedient, and, in the case of turning, is an almost essential mode of preliminary treatment.

4. That Extraction of the placenta, although, perhaps, not so impracticable as Dr. Barnes supposes, is not an operation which can be recommended.

5. That Separation of the placenta from the lower segment of the uterus is a much more justifiable procedure than complete extraction. It may be performed in all cases in which the condition of the parts or the state of the mother prohibits turning; but the evidence in its favour is not as yet sufficiently clear to warrant us in abandoning the older operation of turning. That it arrests hæmorrhage in a considerable proportion of cases is admitted, but, until a more extended experience shall corroborate the conclusions of Dr. Barnes, it would be unwise to admit them as proved. Statistics in such a case are of little value, and this Dr. Barnes himself frankly admits.

6. That the operation of Turning is that in which the great majority of experienced practitioners still place the greatest confidence. If the percentage of maternal deaths under this treatment is, as Simpson says, as high as 27.48, including all cases indiscriminately, we are certainly bound to conclude that, in those instances in which the patient is under treatment from the first, the results will be very much more favourable. It is not to be forgotten that the operation of turning is one which involves special risks—of which laceration of the os and cervix, terminating in uterine phlebitis, is not the least—and that, therefore, we must weigh well the responsibilities we undergo before we reject all other modes of procedure in favour of this operation as it is usually performed. The risk, however, has been greatly modified by the introduction of the bi-polar method of version.

7. To this it may be added that when repeated and alarming hæmorrhage from placenta prævia has occurred during pregnancy, there are many valid reasons for the conclusion that we are warranted in inducing premature labour, especially if the period of viability has already been reached.

Accidental Hæmorrhage—This differs in many essential partic-

ulars from the unavoidable variety commonly called placenta prævia. The designation is, of course, more an arbitrary than a philosophical one, but as it is one generally intelligible to English readers, we shall not attempt to change it. In this case also, there is hæmorrhage before delivery, but there is a most important clinical distinction to be drawn between the two. In the last three months of pregnancy the anatomical connection which subsists between the uterus and the placenta becomes more feeble, so that the one is more easily separated from the other. The wonder then is, not that the separation does in rare instances occur, but that it does not occur more frequently. In accidental hæmorrhage, the placenta is attached to the uterus at its normal site.

What the *Causes* are which, in such circumstances, lead to a separation of the placenta is but little known or understood, but it has been observed that the separation rarely occurs in the young and robust, while, in those who have borne many children, or in whom any cause may have led to constitutional feebleness, it is relatively of more frequent occurrence. If, in such cases, the flooding is to be looked upon as a symptom of constitutional depravity, that of itself renders the case a grave one; but another source of hidden danger is that the hæmorrhage is often concealed. Placental separation indeed occurs, blood is insinuated between the membranes and the uterus, obvious shock and even collapse are produced; and yet no single drop of blood escapes externally, while laceration of the uterine wall has occurred from the over-distension of the cavity by a hæmorrhage such as this. In other cases, again, the placenta has remained adherent at its margin, while an enormous quantity of blood has been effused between the uterine wall and the body of the placenta. These are the cases which have been described as Concealed Accidental Hæmorrhage. It would appear that, in many cases, the separation of the placenta takes place in the centre and not at the margin, and that the blood makes its way towards its lower margin, and thence beneath the membranes, in a downward direction, until it makes its appearance externally. Or, should the separation of the margin occur elsewhere, it is probable that the blood may pass upwards and accumulate in large quantity in the neighbourhood of the fundus. In some cases, the general symptoms are as severe as those which accompany a case of placenta prævia, and, in many, they are much more grave than the actual external flow would seem to account for. Sickness, pallor, dimness of vision, and fatal prostration may thus rapidly supervene in a case of this nature, before even the symptom of flooding has attracted any particular attention.

Accidental hæmorrhage may occur either before or during labour. The great diagnostic feature which, according to all authorities, enables

us to distinguish, during labour, between it and unavoidable hæmorrhage, is that, in the latter, the effect of a pain is to increase the flooding, by still further separating the placenta, while, in the accidental form, the presenting part descends during a pain, and thus, by plugging the cervix, stops the external flow.

Many writers seem to pass over these cases, as if they were of little importance, and were as nothing beside the more interesting physiological speculations which arise from a consideration of placenta prævia. In point of fact, however, they are extremely fatal to the child, and highly dangerous to the mother, so that their management involves, in some instances, no less anxiety than placenta prævia itself. In so far as *Treatment* is concerned, the first and essential step in accidental hæmorrhage is, undoubtedly, to *rupture the membranes*, so as to give egress to the liquor amnii. This, by removing the strain on the uterine walls from within, has a well-known tendency to promote vigorous expulsive action on the part of that organ. It is, besides, the most efficient safeguard which it is possible to procure, for a pain not only plugs the os, by forcing down the fœtus, but, what is more important, it compresses the placenta between the uterus and the child, and, by the same action, mechanically closes the mouths of the vessels from which the blood is flowing. Friction, ergot, and, if there be much depression, stimulants, may also be used, with the object of encouraging uterine action in those cases in which it is feeble or absent. But these means may fail to excite efficient uterine action, and the expulsion of the uterine contents, upon which alone we can depend for the safety of the mother. Should this be the case, our next step, after indulging, in the absence of actual hæmorrhage, in a reasonable amount of expectancy, should be to complete delivery by the operation of turning, in which the bi-polar method should always, if it be practicable, be preferred. The previous evacuation of the liquor amnii will, no doubt, render the manœuvre of turning more difficult than it would otherwise have been; but, on the other hand, as it is failure of uterine action which calls for the latter operation, the atony of the uterine walls will generally compensate for the absence of those conditions which are usually held to be favourable to the performance of the operation of turning.

Under certain conditions, the plug is, in these cases also, indispensable. Its use is indicated more particularly where the condition of the os renders the membranes difficult of access, and where, after rupture of them, hæmorrhage still goes on. We must not forget, however, that although we thus arrest external hæmorrhage, an alarming and even fatal accumulation of blood may take place within the uterine cavity. This is best avoided by the use of ergot and a firm external bandage.

The peril to the woman does not necessarily terminate, either in unavoidable or accidental hæmorrhage, with the birth of the child. In both, the placenta may be retained and give rise to more trouble and renewed anxiety, or the uterine fibres may remain in such a paralyzed condition, after the birth of the placenta, that flooding may still go on from the patent orifices of the uterine vessels. In such an emergency it may, therefore, be necessary to apply some powerful styptic to the bleeding surface, with the view of arresting the *post-partum* hæmorrhage, an object which, in the case of placenta prævia, may be most effectually attained by swabbing the cervical zone with perchloride of iron, alum iron, or some other astringent; but, in the case of the accidental variety, it may be necessary, in order to reach the bleeding surface, cautiously to inject the cavity of the uterus with the same powerful agents. Another source of anxiety in all these cases, even when the immediate dangers of the hæmorrhage and operation have been surmounted, is the risk of puerperal pyæmia and the allied affections, to the development of which such patients are peculiarly prone.

CHAPTER XXIV.

HÆMORRHAGE AFTER DELIVERY.

Hæmorrhage in the Third Stage of Labour.—Abnormal and Retained Placenta, and Irregular Uterine Contraction, as Causes of Flooding.—POST-PARTUM HÆMORRHAGE.—*Causes; General and Local.—Symptoms; External and Internal Hæmorrhage: Examination of the Abdominal Walls: Examination by the Vagina: General Symptoms: Symptoms which indicate the approach of Death.—Treatment; Prevention: Treatment during the Hæmorrhage: Pressure and Friction over the Uterine Region: Effects of Bandaging: Effect of Passing the Hand into the Uterine Cavity: Application of Cold: Injection of Warm Water: Galvanism: Ergot and Turpentine.—Compression of the Abdominal Aorta: Application of the Perchloride of Iron and other Styptics.—Treatment directed to the General Condition of the Patient.—Effects of Rest and Position.—Reaction to be avoided after severe Flooding.—Secondary Post-partum Hæmorrhage.—Transfusion: The "Mediate" and "Immediate" Processes: Dr. Aveling's Apparatus: Injection of Defibrinated Blood, and of Saline Solutions.*

Hæmorrhage in Third Stage.—Although hæmorrhages which precede the expulsion of the placenta are not, properly speaking, *post-partum*, we shall, for convenience' sake, consider them here. The proper management of the placenta, with the object mainly of preventing hæmorrhage, has already been explained in the chapter on the Management of Labour; but there are some other important matters which are still left for consideration, and, as some of these have strong analogies with true post-partum hæmorrhage, it has been thought better to include them in this section of our subject. Retention of the placenta, and consequent hæmorrhage, may be the result of mismanagement; but, independently of this, there are other causes, over which we have little or no control. If the circumstances attending the labour are in all respects normal, the placenta is probably separated entirely, either during the birth of the child, or in the course of the

dolores cruenti which follow it. In a certain number of instances, however, the placenta is not separated in this manner, owing, in one class of cases, to some anatomical peculiarity in the form of the placenta, in a second, to atony, in a third, to irregular contraction of the womb, and, in a fourth, to what has been described as morbid adhesion.

Cases of abnormal placenta, in which the organ is divided, or has detached cotyledons, are of such rare occurrence that no practical importance can be supposed to attach to them. A full account of these, with beautiful illustrations, is given by Hyrtl.[1] Should atony of the uterus be the cause, we must attempt without delay to excite uterine contraction by friction, cold applications, or ergot. In such a case, we have a double cause of hæmorrhage in operation,—an absence of the contractile force upon which the closure of the bleeding vessels depends, and a mechanical hindrance to efficient contraction, arising from the presence of the placenta. Of irregular contractions of the uterus, that which is most frequently spoken of is "hour-glass" contraction, in which a spasmodic stricture of certain fibres of the uterus divides the organ into two cavities, within the upper of which the placenta is imprisoned. This has been described as "*encysted placenta*," and is due, in a great measure, to atony or paralysis of the upper portion of the womb. True placental adhesion depends, again, on actual disease of the decidua or placenta, or, at least, on the presence of morbid products which are the result of antecedent disease.

In all these cases, the treatment is the same, and consists in the speedy removal of the placental mass. If there is a loss of expulsive force, the hand should be cautiously passed into the uterine cavity, so as to grasp the whole placenta. A pause should, however, be made here until contraction takes place, which is to be further aided by the pressure of the hand on the walls of the abdomen, so that, if possible, the placenta and the hand may be expelled together. If this is not done, the placenta may indeed be extracted, but, in such a case, flooding of the true post-partum variety can hardly fail to take place from the flaccid organ. If the so-called hour-glass contraction should be found to exist, the efforts of the operator must, in the first place, be directed to the stricture, which has to be overcome before the extraction of the placenta can be safely effected. There is no doubt, however, that hour-glass contraction is of much less frequent occurrence than is generally supposed. It is a familiar expression, and is apt to be employed loosely, as representing

[1] Die Blutgefässe der menschlichen Nachgeburt. Wien. 1870.

all forms of irregular uterine contraction in which the extraction of the placenta is a matter of difficulty. When the uterus contracts irregularly, this materially affects the process of separation of the placenta, besides mechanically hindering its extraction. The gradual insinuation of the hand into the womb, and the introduction of one or two fingers into the contracted portion, so as gradually, by gentle but sustained efforts, to overcome the morbid spasm which is indirectly the cause of the hæmorrhage, is the treatment which is applicable to such a case. It requires no great force to wear out a spasm of this nature, although at first it may be almost tetanic in its rigidity, so that it will gradually yield, and, by permitting the passage of the hand, admit of the easy removal of the placenta. When the cause of hæmorrhage is the adhesion of a partially separated placenta, it is sometimes necessary to introduce the hand, and forcibly strip the organ from its uterine attachments. This peeling process, which must be conducted very slowly and steadily, will often occupy a considerable time, but, fortunately, the cases in which the operation is required are of rare occurrence. It would appear that, in some of these instances at least, the uterine tissue, with which the placenta is in such intimate connection is morbidly soft and friable, so that the operator runs the double risk of leaving behind adherent portions of a placenta, the bulk of which has been removed, and of injuring the uterine walls, which are no longer, in their structure, such as to admit of even ordinary force. Do what we may, portions of placenta are sometimes left behind, which may require to be removed as the causes of subsequent hæmorrhage, or which may afterwards be spontaneously discharged,—a result which may, although very unjustly, be set down to the discredit of the accoucheur. Such retained masses have been removed, when unusually adherent, and polypoid in shape, by the wire-rope écraseur.

In so far as the ordinary and normal condition of the placenta is concerned, the best safeguard against the hæmorrhage in question is the proper management of the placenta during, and subsequent to, the birth of the child. This has already been described in another section of this work.

Post-Partum Hæmorrhage.—True post-partum hæmorrhage is an alarming and sometimes, in its effects, an appalling occurrence. When, in the course of labour, everything has passed as favourably as could be desired, the child is born alive, and the mother is apparently well, we naturally anticipate, as experience has taught us, a happy issue to the case. But the termination of labour, the real hour of trial to the mother, may be the beginning for her of a new and un-

foreseen peril. One of the essential physiological phenomena of labour is, as has been shown, the efficient contraction of the uterus during and after the birth of the child. This is nature's almost invariable safeguard. At times, unhappily, the uterine fibres which close the blood-vessels are relaxed, and blood pours forth with an impetuosity proportionate to the caliber and relaxation of the vessels, deluging the woman with blood, and reducing her, in extreme cases, to a condition of collapse which may be the immediate forerunner of death. So fearful is the torrent, in the worst cases, that, before we even have time to arrange our plan of treatment, our patient lies dead before us. The more experience one has of the practice of midwifery, the more do we dread the occurrence of this form of hæmorrhage, which we can seldom foresee, and which is therefore all the more appalling, since we have seen no occasion to nerve ourselves nor to prepare for an approaching emergency.

Causes.—A certain number of cases are, no doubt, due to slovenly practice, a neglect of those details which should be matter of routine in every case. But, while such causes may generally be avoided by ordinary skill and attention, there are other instances where the causes upon which the flooding depends are comparatively little, and sometimes not at all, within our control. One of the most important, and, at the same time, most common causes of post-partum hæmorrhage is uterine inertia. It may be that in these cases the uterus is simply exhausted, and complete atony is the immediate sequel of labour. Anything which may have tended to reduce the vital powers may lead to this. In women who have long suffered from wasting diseases, whose constitutions may have been exhausted by many rapidly succeeding pregnancies, or in whom the vital energies have been in a measure sapped by a long-continued or complicated labour, we see illustrations of those conditions, which are predisposing causes of hæmorrhage after labour. No small proportion of the fatal cases seem to have occurred in women who were the subjects of the more advanced stage of Bright's disease, or of any similar disease which exercises a deteriorating influence on the composition of the blood, increasing the watery at the expense of the corpuscular elements. When the placenta is of unusual size, or attached over a larger area than usual, the risk of hæmorrhage is proportionally increased.

It has been observed that, when the labour is unusually rapid, either from violent expulsive effort or deficient resistance, there is a tendency to post-partum flooding. It would appear, therefore, that one condition of safety is a gradual emptying of the uterine cavity. In this way the fibres have time to contract to the enormous extent which is essential

to the effectual closure of the vessels; whereas, sudden contraction, although possibly efficient enough as regards delivery, cannot maintain itself, and is often followed by such complete relaxation, that flooding is almost sure to occur. This, no doubt, is the reason why, after delivery by the forceps, and in some other obstetrical operations, flooding is more frequently observed—an excellent and sufficient warrant for the strict observance of the obstetric aphorism that we should empty the womb in operative cases as slowly as possible, and allow it to contract upon the child as it is being expelled. Sometimes, however, anxiety for the life of the child and other circumstances may lead us, for what may seem good reasons, to disregard this maxim; but, in doing so, we should always admit into our calculations the fact that, in avoiding one danger, our pilotage may cause us to make shipwreck on another somewhat more remote.

Myomatous growths connected with the uterus, and especially polypi, are, if present, almost certain causes of hæmorrhage after labour. It is well known that hæmorrhage is one of the earliest and most constant symptoms of this affection in the unimpregnated state, and it is not therefore to be wondered at that the proclivity to flooding should be more marked at the critical period which immediately succeeds delivery. This symptom may be caused in two ways, either by hæmorrhage from the mucous surface of the tumour, or by the mechanical interference which it exercises in preventing the proper closure of the venous orifices in the wall of the uterus.

Another affection may here be mentioned as an undoubted cause of post-partum hæmorrhage, and which has, even by experienced observers, been mistaken for a fibroid polypus. We allude to Inversion of the Uterus. The symptoms of this, which will be more fully noticed in the following chapter, are indeed such as, under ordinary circumstances, could scarcely be mistaken. In the one, we have a tumour generally ovoid in shape, connected with a pedicle which we can trace up to the os or beyond it to its intra-uterine attachment; in the other, we have also an ovoid tumour, but which ends abruptly by a more extensive attachment, within easy reach of the finger. In the former case, we find the distal extremity of the tumour encircled by a ring, formed by the os uteri more or less contracted; in the latter, there is no such constriction. But this, be it remembered, applies only to the diagnosis of *complete* uterine inversion, which must pass, slowly or more rapidly, through various stages before it becomes complete, and at any one of these it may be arrested. In other words, inversion may be either partial or complete, and it is the former condition only which is likely to be mistaken for a polypus. In a case which, many years ago, came

under our notice, there was a rounded tumour, narrowing towards its upper part and tightly embraced by the os, and it was this condition which led to an erroneous diagnosis. In a precisely similar case, one of the most distinguished accoucheurs in Britain made a similar error, but fortunately discovered his mistake, just as he was about to remove the tumour by the écraseur, by the pain which the patient complained of, and which he knew by experience was a most unusual symptom in manipulating polypi. Let us beware, therefore, of mistaking a partially inverted uterus for a polypus which is protruding from the uterine cavity.

Symptoms.—These are flooding, or the general symptoms to which flooding gives rise, or both of these combined. In by far the greater number of instances, the external discharge is at first, and throughout the whole course of the case, the most alarming, as it is the most palpable sign. It may immediately succeed the birth of the child, or may first come on after a longer or shorter interval. The quantity of the discharge is very variable, and upon this will depend, in a great measure, the opinion which we may form as to the gravity of the case. Generally, symptoms, more or less distinct, of uterine inertia will be manifested. The firm tumour which we are accustomed to feel behind the pubes loses its distinct outline, and becomes less perceptible to the touch, or may disappear altogether, so that we can perceive nothing but softness and flaccidity. We may then feel parts, such as the projection of the last lumbar vertebra and the promontory of the sacrum, which we know to be separated from the fingers by the tissues of the womb. If the inertia or atony of the uterus is complete, this condition is persistent, and, on introducing the hand into the cavity, which may generally be effected with ease, we find that the uterine walls are soft throughout, and, as Cazeaux graphically describes it, "folded together like a piece of old linen." Such a condition, should it precede the separation of the placenta, may exist without hæmorrhage; but, if the third stage of labour has been completed, flooding is inevitable. In many of these cases, however, it will be to the observer a matter of wonder that the hæmorrhage should not be more profuse. Sometimes there are efforts on the part of nature to effect uterine contraction, when the hand, in the hypogastric region, may detect alternate relaxation and contraction of the organ, the latter periods being accompanied by the expulsion of such blood as may have accumulated within the cavity during the former. This disposition to rhythmical action on the part of the uterus is not at all uncommon, nor is it to be looked upon with unnecessary apprehension, unless the actual flow of blood, or the general symptoms, are grave.

The absence of alarming external hæmorrhage is a negative symptom, which may divert the attention of the inexperienced from the true nature of the case. In some of these cases, bleeding may be going on internally, to an extent which may rapidly place the woman in a position of extreme peril. The continuous absence of the uterine tumour, and the formation, subsequently, of an extensive and soft abdominal swelling, progressively increasing in size, will, along with the general symptoms which rapidly develop themselves, soon indicate what is going on. The conditions under which such symptoms may manifest themselves, are, first, a state of the uterus which admits of easy dilatation; and, second, anything which mechanically impedes the external flow. Any displacement of the flaccid womb which may close the external orifice mechanically, is sufficient, in the first instance at least, to check the flow in the direction of the vagina. Subsequently, the occlusion of the orifice with a clot, which will form a more effective plug if the os and cervix should be in any degree contracted, and, at an earlier period, the pressure of the wholly or partially detached placenta, may in this way form a barrier which, under ordinary circumstances, would speedily be swept away, but which, in the utterly flaccid and dilatable condition of the uterus, may be sufficient for the development of the phenomena in question. Sometimes, this process of distension is accompanied by great agony, which is not the result of attempted contraction of the organ, but of the morbid phenomenon of over-distension, an indication which is not unfrequently noticed in distension of the other hollow viscera. If the hand of the operator is now introduced into the cavity of the womb, he will recognise still more clearly the condition of matters, and he will find his fingers entangled in an enormous mass of clots, with which, and with fluid blood, the cavity is distended to an extent which may equal the size of the organ at the natural period of mature gestation.

The general symptoms which indicate post-partum hæmorrhage may exhibit themselves equally in external and internal hæmorrhage. They are, unfortunately, familiar to all experienced practitioners, but, as symptomatic of the accidents we are now considering, they are, for obvious reasons, of greater importance in those instances in which the hæmorrhage is internal. In the worst cases, the symptoms are truly appalling, and in the course of a very few minutes the loss of blood may be so enormous as to plunge the woman, almost without warning, into a state of fatal syncope. In cases which, though less desperate, are scarcely less alarming, the woman may, with or without previous abdominal pain, and with or without external hæmorrhage, experience a feeling of faintness associated with marked pallor. The vision

becomes dim, and she calls out that she can no longer see; vomiting frequently occurs, and the extremities and general surface of the body become cold and bedewed with a clammy perspiration. The pulse becomes rapid, small, or imperceptible, and the paleness becomes so marked, so greatly exceeding all others, that Dr. Tyler Smith has called it "puerperal pallor." In some cases, however, the effect on the circulation is such as to produce, in the first instance, what is familiar to surgeons as the "hæmorrhagic pulse," a symptom which is apt to mislead the inexperienced. This is a bounding and *apparently* full pulse; but, if its character be more carefully tested, it is found to be remarkably compressible, and soon, with a continuance of the flooding, merges into the more familiar condition of feebleness and imperceptibility.

Such symptoms are manifestly indicative of a state of extreme peril, and, if prompt and skilful aid be not speedily afforded, are too often the precursors of death, which may be preceded by dilatation of the pupil, hysterical paroxysms, or even by convulsions. It has frequently been observed that the amount of blood lost is not a safe criterion of the danger; for, not only are we apt to be deceived in regard to the amount of internal hæmorrhage, but there is the greatest possible variety in the symptoms which, in different women, attend a loss of a precisely similar amount; and it may be added that it is not invariably the strong and robust who bear hæmorrhage best, or recover most rapidly from its effects. In those cases in which hæmorrhage after labour is due to a laceration, more or less extensive, of the os, or of any other portion of the parturient canal, the symptoms are rarely such as to excite alarm. The dangers to which such occurrences give rise are of a different nature, and do not manifest themselves till a later stage.

Treatment.—There are, perhaps, few practical questions involving more anxious consideration than this. The young practitioner may find an illustration in the first case of midwifery which he is summoned to attend. He has no time for reference to books, no moment even during which he may appeal to his memory for facts which have escaped it, and he must, therefore, be fully prepared by a thorough acquaintance with the subject, or he is unable to cope with so great an emergency. The principles on which all treatment depends, demand, then, his careful attention.

It is perhaps scarcely possible to attach too great importance to the prevention of post-partum hæmorrhage. Much will depend upon a proper management of the various stages of labour, retarding the action when this has a tendency to be precipitate, promoting it when the pains are feeble, and acting otherwise as has been recommended in the

chapter on the management of labour. The importance of never leaving a woman until you are satisfied with the uterine contraction after delivery will, in view of the circumstances above stated, now become more manifest. We can never be sure of the case unless we are satisfied on this point. There are certain points here, however, which, if not understood, might result in the *nimia diligentia* of the tyro. First, it must ever be borne in mind that each case of labour is accompanied in its last stage by a certain amount of hæmorrhage, and this is not unfrequently considerable, without being accompanied, either then or subsequently, by any other symptoms which should excite alarm. A second circumstance which may cause needless alarm is the gush of liquor amnii, mixed or coloured with blood, which immediately follows the birth; and a third consists in what we very frequently observe, a certain amount of alternate contraction and relaxation resembling, in some degree, the conditions above-described. An erroneous inference, drawn from these observations, we have known to lead to treatment which was energetic enough certainly, but quite unnecessary, and, moreover, not unattended with risk. Caution must, therefore, be exercised, lest, by giving undue prominence to one symptom without reference to the others, needless panic and improper interference be the result.

Preventive Treatment.—There are cases in which the history of previous labours, no less than the circumstances attendant on that which is going on, indicate at least the probability of a similar result, and in such it is always proper towards the end of the second stage, or at least before the extraction of the placenta, to administer ergot, with the object of ensuring efficient contraction; and the same agent may be used in all cases in which, after the expulsion of the placenta, there is a tendency to atony. Moreover, we would do wrong, knowing what we do of the effect produced upon the uterus by excitation of the nipples, were we to omit to have the child placed early to the breast. These means, along with the application of the abdominal bandage, and the other details which have previously been fully described, constitute what is called preventive treatment.

To Promote Uterine Contraction.—The course of procedure, to be adopted in actual presence of the emergency, is the real question which may task our knowledge, our nerve, and our ingenuity to the utmost. The object which, before all others, we have in view, is to promote uterine contraction, and if we fail in this, we fail utterly. Of the various methods which we have at command, that which is invariably first employed is manual pressure, exercised upon the fundus of the uterus, and also upon its lateral walls, by attempting to grasp the whole organ. In doing this, we do not so much depend upon the effect of

such mere mechanical compression, as upon the more indirect action whereby the uterus is excited to contract, a result which is further encouraged by circular friction exercised over the fundus of the organ. The effect of the abdominal bandage at this moment certainly is to aid contractile effort, by affording a substitute for the support which has been lost by the inevitable relaxation of the abdominal walls. The bandage is, however, no advantage, but the contrary, when it prevents us from ascertaining and, when necessary, continually watching the condition of the uterus and its relation to the abdominal walls. It is best to have it loosely attached, so as to admit of easy removal and re-application, and by placing one or more folded towels over the hypogastric region, the compression of the uterus is kept up continuously, and is not temporary or intermittent as that of the hand necessarily must be. Unless, however, the means already adopted are promptly followed by satisfactory uterine contraction, the hand should be passed into the vagina without hesitation or delay, so as to ascertain the condition of the uterus more exactly. Sometimes, the irritation of the cervix which is thus caused, results, with the aid of the external hand, in the action so much desired; but, should the organ remain in a state of complete atony, the hand must be passed into the cavity, in order still further to stimulate contraction by contact with its internal surface. When the hand is so passed it should be moved about cautiously within the womb, so as to collect the clots in the palm. This movement will generally suffice to awaken uterine action, but in every case we must be careful not to remove the hand except during sensible contraction, when the uterus may be permitted, as it were, to expel the hand, and with it the retained clots.

Effects of Hot and Cold Water.—The reflex effect of cold in producing uterine action is often well marked. This may be applied either to the abdominal or thoracic walls, to the vulva, or by injection to the rectum or vagina. It has often been observed, even in cases in which the action of this powerful agent was at first marked, that its *continuous* action is not to be depended on. However effectual, therefore, it may seem in the first instance, when applied suddenly by the douche or otherwise, it should not be continued too long, otherwise an effect the reverse of beneficial is apt to be produced. The injection of the uterine cavity with iced water, or the application to the inner uterine surface of a piece of solid ice, is, under circumstances of emergency, quite justifiable, and has often proved efficacious. The alternated action of heat and cold has been found more useful than sustained cold, and, in some cases in which cold has failed, the injection of water at 110° Fahrenheit will sometimes produce the most favourable results.

M. Evrat recommended the use of a peeled lemon, which he introduced into the cavity of the uterus and then squeezed, so as to project the acid juice upon the bleeding surface. A sponge wrung out of vinegar or other astringent has, in the same way and for the same purpose, been introduced, and the effect of such an application has not unfrequently been to rouse the uterus from its dormant condition. Galvanism has also been employed with good effect, and may always, if immediately available, be tried. In cases in which clots again form within the cavity of the womb, these should be removed, as, by presenting a mechanical impediment to feeble contraction, they encourage a continuance of the flooding; and, as before stated, it is well to allow the hand and the clots to be simultaneously expelled by uterine action, should it be possible to arouse the organ to such an effort.

Ergot and Turpentine.—In the worst cases, little dependence can be placed in the use of ergot, for before sufficient time has elapsed to admit of the physiological action of the drug, the patient may be dead. If employed, it is to be given in full doses, and at as short intervals as is possible. The stomach will, however, often reject it, as indeed, when the patient is in a state of extreme collapse, it will reject anything solid or fluid which may be swallowed. This is not to be looked upon as in itself an unfavourable occurrence, as it has often been observed that violent retching is attended with uterine action, so much so indeed that some practitioners have actually prescribed ipecacuanha with the view of obtaining its emetic effect. Turpentine in half-ounce doses has been strongly recommended, and its effects seem in many cases to have been most satisfactory. Plugging, as a method of treatment, is of ancient origin, and has been advocated in modern times by Leroux and others who adopted his opinions; but, as it has proved inefficacious, it has been abandoned. The mode of action must obviously have been, whether the plug was applied in the vagina or within the womb, to convert external into internal hæmorrhage, and in no sense, therefore, to benefit the patient. The last attempts of this nature which have been made would seem to have consisted in the introduction within the uterus of Gariel's air pessary, which was then distended in the hope of compressing the bleeding vessels, an effect which a more correct knowledge of the condition of the uterus will not permit us to count upon.

Compression of Aorta.—The flaccid condition of the abdominal walls which immediately succeeds delivery, enables us, without difficulty, to press upon, and more or less effectually, arrest the flow of blood through the aorta. In desperate cases, therefore, the compression of this great vessel has been practised, in order to arrest the torrent which continues to pour from the uterine vessels; but the practice has by some

been violently opposed on theoretical grounds. Baudelocque maintained continuous pressure upon the aorta for several hours, and imagined that in this way there was at least a gain of time, during which ergot and other agents might act, and the strength of the woman be restored. The most weighty objection to the practice is obvious in the fact that the source of the hæmorrhage is not so much in the curling arteries as in the venous sinuses, so that aortic compression cannot be supposed to exercise a very decided effect. But there is, moreover, another objection which has been urged—viz., that it is scarcely possible to compress the aorta, without at the same time subjecting the vena cava to more or less pressure, so that directions have been given whereby the pressure is to be directed to the left side of the vertebræ, in order to avoid the vena cava. Cazeaux believes that the result of such compression of the vena cava should be looked upon as rather a favourable condition than otherwise; and we are certainly inclined to agree with him in thinking that, in the worst cases, the volume of blood can only be accounted for by supposing that it proceeds, by regurgitation, from the great venous trunks. Two methods of compression of the aorta have been recommended; in the one, the vessel is compressed through the abdominal walls, and in the other the hand is passed into the uterus, and the vessel closed—as is assumed, more effectually—by pressure through the posterior uterine wall. While it must be confessed that the results of this procedure have not been such as to encourage us to look upon it with anything like confidence, there still seems to be in it a ray of hope, to which, when all else may have failed us, we cannot close our eyes. By all means, therefore, let aortic compression be tried. There is certainly no evidence upon which we can rely, that the practice has ever been productive of harm, while many believe that it, at least, arrests temporarily the rapid collapse which is so characteristic of a considerable proportion of such cases.

Use of Styptics.—The application, not of astringents merely but of powerful styptics to the inner surface of the uterus, is a mode of treatment which has, during the last few years, attracted considerable attention in this country. The procedure is not a new one, and even as regards the styptic salts of iron, which are undoubtedly the best, they were originally used by D'Outrepont, and also by Kiwisch, who, upwards of thirty years ago, strongly supported this method of treatment. The action of such powerful agents is looked upon by most practitioners with considerable apprehension, and that it is so, is not, perhaps, to be wondered at. Nothing is more unjustifiable than such a procedure, unless other means have been tried, and have failed to arrest the flow of blood; but, in the presence of a great danger

and instant peril, the objections to the application of styptics have less force. We do not wish in any way to undervalue these objections; but, even admitting their validity, and viewing the operation in the light of a desperate remedy, the facts which are given by Kiwisch are such as to afford us much encouragement, and indeed to warrant us, in cases of emergency, in availing ourselves of this method of treatment.

It is proper, however, to notice here the dangers which may arise from the injection of perchloride of iron, which have been very fairly put by Dr. Barnes, the chief supporter in this country of the bold employment of the more powerful styptics. The perchloride produces immediate coagulation of any blood with which it may be brought in contact, but the danger to be dreaded is that such coagulation might extend further, and, should coagula be carried to the centre of circulation, death would be the probable, if not the inevitable, result. Immediate death has followed the injection of even a few minims into a nævus, and in one such case "examination showed that the point of the syringe had penetrated the transverse facial vein, and that the blood in the right cavity of the heart had been immediately coagulated." Several cases have occurred, in which an injection of the perchloride into the womb has resulted in death by peritonitis, caused by the passage of a portion of the injection through the Fallopian tube. A similar result, indeed, has followed the injection of fluids which are comparatively innocuous, so that the possibility of such an accident must, under no circumstances, be lost sight of. Forcible injection of the uterine cavity should never be attempted. Were it possible thoroughly to sponge the inner surface of the uterus in an efficient manner, this no doubt would be preferable; but, as it would be all but impossible thus to bring the styptic solution into actual contact with the bleeding surface, some other means must be adopted.

The following is the course recommended by Dr. Barnes:—"You have the Higginson's syringe adapted with an uterine tube eight or nine inches long. Into a deep basin or shallow jug, pour a mixture of four ounces of the Liquor Ferri Perchloridi Fortior of the British Pharmacopœia, and twelve ounces of water. The suction tube of the syringe should reach to the bottom of the vessel. Pump through the delivery tube two or three times to expel air, and ensure the filling of the apparatus with the fluid before passing the uterine tube into the uterus. This, guided by the fingers of the left hand in the os uteri, should be passed up to the fundus. The injection should then be effected slowly and steadily, when you will find the fluid come back into the vagina mixed with coagula, caused by the action of the fluid. The hæmostatic effect of the iron is produced in three ways: first, there is its direct

action in coagulating the blood in the mouths of the vessels; secondly, it acts as a powerful astringent on the inner membrane of the uterus, strongly corrugating the surface, and thus constringing the mouths of the vessels; thirdly, it often provokes some amount of contractile action of the muscular wall." All facts hitherto recorded seem to show that we have in this a powerful means of arresting uterine hæmorrhage, but, if we are to employ it at all, it is clear that we should not defer its application too long, but resort to it without hesitation so soon as the ordinary means have received a fair trial.

In the course of any treatment which may be adopted, the general condition of the patient must of course receive earnest and continuous attention. The tendency to syncope must be combated by free stimulation by brandy, or by brandy and opium in combination, upon which, we confess, we place even more reliance. The frequently repeated objection to opium in such cases is, that it is an agent which arrests uterine action, and therefore should be avoided when our object is exactly the contrary of this; but experience has shown that a drachm of laudanum, or forty minims of Battley's solution, combined with brandy or some other stimulant, will always be found, if it acts at all, to act in a beneficial manner by rallying the patient from collapse, and either thus indirectly, or, it may be, by a more direct action, exciting the uterus to contract. The patient should always be placed upon her back with the pelvis high and the head low. The object of this is, not only to take advantage as far as is possible of the law of gravity as a hæmostatic, but also to prevent that lateral bagging which is apt to take place in a relaxed uterus in the ordinary obstetrical position. Perfect rest and the recumbent posture are essential, not only at the time of the hæmorrhage, but for a considerable period thereafter. All danger does not cease with the arrestment of hæmorrhage, or even with uterine contraction, so that all these measures must be insisted upon as safeguards against the recurrence of the peril with which the patient has been menaced. If it be a rule never to leave a patient, even after natural labour, without satisfying ourselves of the state of the uterus, how much more important must it be to watch the case in which hæmorrhage has already caused us anxiety, and in which there is always a tendency to its return. Flooding may, in some instances, only become alarming when some time has elapsed after delivery; but in most cases it will be found to be due to the retention within the womb of a portion of the placenta or membranes, or of clots which have prevented the thorough closure of the cavity.

The tendency to syncope should, in all cases, be combated as far as

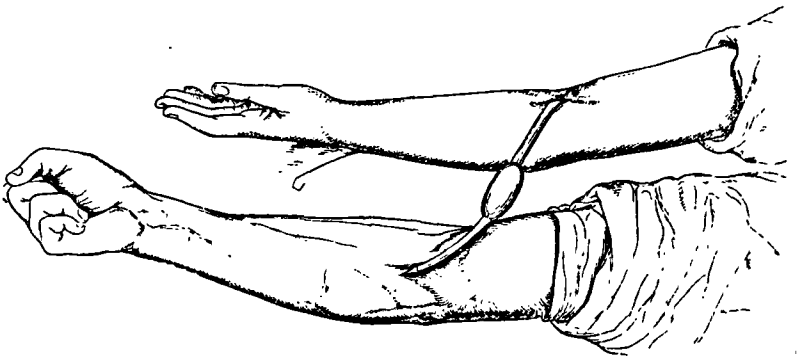
is in our power; nor, in a condition of great depression, should the patient be permitted to yield to the drowsiness which overtakes her, as this may prove as fatal as that which is the result of exposure to intense cold. The period of convalescence after severe hæmorrhage is one which may require great care and management. There is, above all, a tendency to reaction, which may manifest itself in the form of præcordial oppression, severe headache, and throbbing of the carotids, which injudicious treatment, either by alcoholic stimulants or improper articles of diet, may increase to symptoms more serious still. The bulk of the blood which has been removed must be replaced gradually, and with caution; and, although the tolerance of stimulants is, during the hæmorrhage and in presence of the symptoms of collapse, sometimes truly marvellous—when brandy seems to produce no more effect on the brain than as much pure water—it is quite otherwise when the immediate danger has passed and the patient begins to rally. When the symptoms which indicate reaction subside, it may be necessary to persevere, by means of generous diet, old wine, and tonics, for many weeks, or even months, before the system recovers from the fearful state of depression into which it has been thrown.

Secondary Hæmorrhage.—It sometimes happens that hæmorrhage comes on a considerable time after labour has terminated in an apparently favourable delivery. This is what has been described by M'Clintock,[1] under the name of *Secondary Hæmorrhage*, as "commencing after a patient has been six hours delivered, and within a month from this event." Although this variety occasionally springs from constitutional causes, it is more frequently associated with retention of a portion of placenta, or clots in the cavity of the womb. In other cases, the flooding has been found to be due to a polypus or even to inversion of the uterus, while, among the rarer causes, may be mentioned the bursting of a uterine hæmatocele and retroflexion. In some of these cases, a careful examination will at once reveal the cause of the hæmorrhage, and suggest the appropriate treatment, but, in others, we may only be able to conjecture that the cause is to be discovered within the uterus. In the latter case, it is often necessary to dilate the os, by tents or otherwise, so as to admit of a thorough exploration of the uterine cavity, with a view to the removal of the cause or it may be the application of styptic agents. If a portion of the membranes or of the placenta has been retained, and the case otherwise left to nature, the woman will probably be subject for a time to repeated and possibly dangerous floodings, until the retained parts are gradually decomposed, and discharged, though at the risk of septicæmia, in the form of a fœtid lochia.

[1] Clinical Memoirs on Diseases of Women. Dublin, 1863.

Transfusion.—There are cases in which the arrest of hæmorrhage, although complete, seems to have come too late, the recuperative forces of nature having been too seriously compromised. There remains in these cases a state of utter prostration in which there seems to be no tendency to rally, an irritable stomach, a continued tendency to syncope, and an apparent arrestment even of the function of assimilation. Such a state of matters can only terminate in one way, unless we can induce a rally, and the feeble hold which the patient has on life is gradually, but too surely, relaxed. These are the cases in which, however desperate the circumstances, the operation of transfusion has succeeded, and we hope may often again succeed in rescuing the woman from the very jaws of death. This operation may be performed in various ways. The simplest process is that of *immediate* transfusion by some such simple

Fig. 146.



Dr. Aveling's Apparatus for Transfusion.

apparatus as has been recommended by Dr. Aveling.[1] This is described as consisting "of two small silver tubes, to enter the vessels, and of an india-rubber tube by which they are united, and which has in its centre an elastic receptacle, holding about two drachms. It is without valves, and is simply a continuous pipe with an expanded portion in the middle. By its means, the vessels are, as it were, extended from one to the other, and a supplementary heart is added to regulate the circulation." Air is got rid of by first pumping water or a saline solution through it, and then seeing that it is quite full of blood before the tube is inserted into the recipient vein.

In what has been called, in contra-distinction from the other, the *mediate* process, the blood is first received in a vessel, in which it is kept at the proper temperature, and it is thence injected by means of a syringe,

[1] Obstetrical Transactions, vol. vi., p. 133. 1865.

different varieties of which have been devised by Drs. Little, Richardson, and Graily Hewitt. In addition to the difficulty which attends the exclusion of air, another and no less formidable one consists in the tendency of the blood to rapid coagulation. It has been attempted, with the view of obviating the latter, to inject the defibrinated blood only, the blood being received in an open vessel, rapidly stirred so as to promote coagulation, and then filtered. In a considerable number of cases, this process has been attended with successful results, sufficient at least to prove that the presence of fibrin is not essential; but the preponderance of professional opinion is decidedly in favour of the "immediate" process. It has been proposed by Dr. Richardson, as a corollary to certain well-known experiments and conclusions of his, to prevent coagulation by the mixture with the pure blood of ammonia, in the proportion of three drops to each ounce; and, with the same object in view, Dr. Braxton Hicks has used the phosphate of soda. Some, arguing from the effects which have been known to follow the injection of a simple saline solution into the blood in the collapse of cholera, have advocated a similar mode of procedure in hæmorrhagic collapse. The quantity to be introduced is much greater than when blood is used, and the following is the formula for the preparation of a solution which was recommended by Dr. Little:—

Chloride of Sodium, ...	60 grains.
Chloride of Potassium, ...	6 ,,
Phosphate of Soda, ...	3 ,,
Carbonate of Soda, ...	20 ,,
Distilled Water, ...	20 ounces.

Perhaps the simple apparatus and process of Dr. Aveling is the best for ordinary purposes which has hitherto been devised, and from its simplicity of construction, it may be used by any one possessed of moderate dexterity. The operation has not been confined to cases of post-partum hæmorrhage, but has also been employed in placenta prævia, when the patient was too prostrated to survive delivery unless previously rallied. The successful performance of transfusion may, although followed by a rally, be again succeeded by renewed flagging of the circulation, and a recurrence of the original symptoms. In this case it would be quite proper to repeat the injection. Professional attention has of late years been so thoroughly awakened to the importance of this procedure, that there exists in the minds of many experienced practitioners a strong hope, and some confidence, that obstetric mortality may in this way be in some measure reduced.

CHAPTER XXV.

INVERSION OF THE UTERUS.

Varieties of Inversion: Three Stages of the Ordinary Variety.—Inversion of the Unimpregnated Uterus.—Inversion usually occurs during the Third Stage of Labour.—Causes: Dragging upon the Cord: Shortness of the Cord: Irregular Contraction of the Uterus.—Connection of this Accident with Hour-glass Contraction.—Effects of Paralysis of the Fundus.—Mechanism of the Displacement.—Symptoms: Peculiar Violence of the Shock: Hæmorrhage: Absence of Tumour in Hypogastrium.—To be distinguished from a Polypoid Myoma.—Sensibility and Occasional Contractility of the Tumour.—Modes of proving the Absence of the Uterus from its Normal Situation.—Recurrence of Hæmorrhage in Chronic Inversion.—Treatment: Ordinary Method of Replacement: Management of the Placenta if still Adherent: Management of more Difficult Cases: Compression of Tumour: Depaul's Instrument.—Chronic Inversion: Montgomery's Method of Reposition: Constriction of the Os must be Overcome: Effects of Sustained Elastic Pressure: Division of the Stricture: Removal by the Ecraseur.

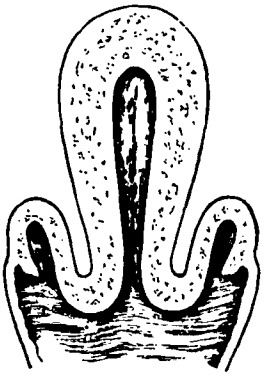
INVERSION of the Womb has already been referred to in the preceding chapter as one of the causes of hæmorrhage after delivery. Although the accident is by no means of frequent occurrence,[1] it is not to be supposed that, on this account, it is to be treated as one of minor consequence. On the contrary, it involves so many practical questions, and is, moreover, a subject in regard to which so much misapprehension has existed, and still exists, that it is necessary to devote some space to its consideration.

The idea essentially involved in the term "Inversion of the Womb" is an abnormal condition of that organ, in which, in extreme cases, the whole organ is turned inside out. As has already been remarked, such

[1] Hospital statistics give one case to about one hundred and seventy thousand labours. We are convinced, however, that, in private practice at least, it occurs with much greater frequency than this.

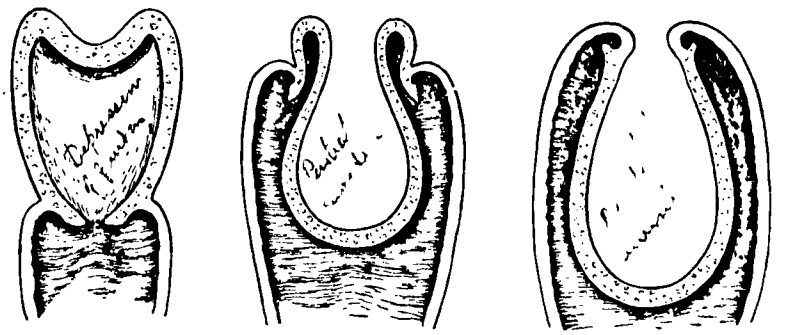
a displacement must, in becoming complete, pass through a variety of stages; and as, at any one of these stages, the inversion may be arrested, it is possible to imagine an almost infinite number of varieties of inversion. We shall, however, only mention four. Of these, the first is not generally described, but it is said by Dr. Matthews Duncan to be "not rarely observed after delivery." The condition of the parts is as shown in this diagram (Fig. 147), and consists, therefore, in an inversion of the inferior segment of the uterus only. This variety, although probably not uncommon, and possibly sometimes the forerunner of complete inversion, is of no great practical importance, and will probably rectify itself without assistance. It is otherwise with the three varieties which are figured diagrammatically in Figs. 148, 149, 150. All these are as will be observed at a glance, merely stages in the progress of the same accident, which is the true Inversio Uteri of authors, and which differs from the other and less important variety, in commencing at the fundus. The ordinary course is—first, one of Depression of the Fundus (Fig. 148); second, one of Partial (Fig. 146); and, third, one of complete Inversion (Fig. 150). In a stage more advanced still,

Fig. 147.



Partial Inversion. (After Matthews Duncan.)

Fig. 148. Fig. 149. Fig. 150.



Successive Stages of Inversio Uteri.

the inverted womb may protrude from the vulva—a condition which necessarily involves at least partial inversion of the vagina, which is dragged down by the womb.

Although essentially one of the accidents of midwifery practice, there

are cases in which the uterus becomes inverted independently of the pregnant state. Most of those are instances in which there is either a polypus within the cavity, or a myoma in the walls of the uterus, which, by acting in a manner as foreign bodies, excite the organ to contractile and expulsive action, terminating in inversion. It is a disputed point whether inversion of the normal and unimpregnated uterus is, in any other circumstances, possible. On this point Dr. West says, "Inversion of the uterus, the turning of the organ inside-out, is an accident clearly impossible in the natural condition of the unimpregnated woman,—it being obviously essential for its occurrence that the organ should have attained a certain size, and that its walls should be comparatively yielding." This opinion is adopted by Matthews Duncan and others; but Dr. Tyler Smith believes on the other hand, that the unimpregnated uterus may invert itself, under the influence of irregular contraction. We are not aware that any case has been recorded in which the evidence of inversion, under such circumstances, is not open to doubt, more or less strong. At the same time, we must confess that we agree with Tyler Smith's conclusion. It is certainly true, as he says, "that the unimpregnated and virgin uterus, particularly under irritation, possesses more motor power than is generally attributed to it;" and we can see no physiological reason which can warrant us in assuming such an inversion to be impossible. Many years ago, we had occasion to assist at the post-mortem examination of a young woman who had died of fever, and who had suffered previously to her death from severe flooding. The uterus was found completely inverted, and very little, if at all, larger than the normal unimpregnated standard. There was no myoma. This case corroborates strongly the assertion of Tyler Smith, and, at least, proves that previous enlargement of the organ, and a yielding condition of its walls, are not, as West supposed, essential. There cannot be the slightest doubt that the presence of a polypus, or of anything else, within the cavity of the uterus must so far encourage inversion, both mechanically and physiologically. In the above case, there may have been a clot; but, whether or no, it and others of an allied nature seem to show that inversion of the unimpregnated uterus may occur, independent of polypus, or any other similar condition.

Causes.—The occurrence of uterine inversion, coincident, as is to be feared, very frequently, with the practice of dragging upon the cord after the termination of the second stage of labour, has led not unnaturally to a prevalent belief that this was the usual cause of the accident in question; and it has also been supposed to be due, in some instances, to spontaneous dragging by a funis which is either too short, or has been rendered so by twisting round some part of the child.

According to those ideas, the uterus must be looked upon as a passive agent, the fundus or site of placental attachment being mechanically displaced in a direction downwards, and ultimately through the os and into the vagina. That a certain number of cases are thus produced, most observers will probably admit, and Henning is probably correct in assuming that the risk of such an inversion is greater when the placenta is attached to the fundus, but the conclusion arrived at by all who have paid, in recent times, most attention to the subject, is, that the importance of this, as a cause, has been in every way exaggerated. A strong pull at the cord, while the uterus is in a state of flaccidity or complete atony, may doubtless—and especially if the placenta be morbidly attached—at once turn the organ inside out. Indeed, if such flaccidity were the normal condition of this stage, it would be a matter of wonder that the accident should not more frequently accompany every effort in this direction. Fortunately, however, nature here interposes her authority, and effectually guards the woman from the effects of operative mismanagement. Nothing, as a moment's reflection will show, is so certain, so effectual a safeguard against inversion, as regular and symmetrical contraction of the whole uterus. It is well, therefore, that a very common effect produced by pulling upon the cord is a contractile action of this nature, by which, for the time being, depression or introcession of any part of its walls is rendered impossible. Be it observed, however, that this observation applies to *regular* contraction only.

Irregular Contraction.—The uterus does not, in every instance, follow the method of regular contraction. On the contrary, it not unfrequently is the seat of irregular contractions, which affect certain portions only of the walls, while other parts are left in a temporary condition of relaxation or atony. One form of this has already been mentioned as a cause of retention of the placenta by what is familiarly known as "hour-glass" contraction of the uterus, and otherwise as "encysted placenta." It would seem as if, in the opinion of many, this was the only form of irregular uterine contraction, whereas there can be little doubt that an infinite variety of such irregularities may exist. It is, in fact, among such abnormal conditions that the true cause of ordinary inversion is to be sought. Many of the older writers recognised the presence of such contractions as we now allude to, and one of the earliest observations in this direction was that a frequent site of this localized inertia is that portion of the uterus upon which the placenta happens to be implanted. The important bearing which this has upon the cause and mechanism of hour-glass contraction was clearly pointed out by Levret, although altogether overlooked by many subsequent writers. "The neck of the uterus," says Madame Lachapelle, "is

often inert, although the fundus is contracted; sometimes the reverse happens, and it is then that the placenta, enclosed in the uterus, appears to be encysted in it." As the nature of these and other abnormal conditions of contraction is more exactly ascertained, the relation which they bear to inversion of the uterus comes into view. All modern observers agree in the observation that a local uterine paralysis, involving, as a matter of course, more or less irregular contraction, occurs more frequently at or near the site of the placenta than in any other part of the uterus. As this is the part which, by its introcession or depression towards the centre of the uterine cavity, forms the first stage of inversion, the coincidence of the displacement with the site of local paralysis has drawn special attention to the fact. Rokitansky, in his work on Pathological Anatomy, says on this point:—"We must here mention a very singular circumstance, which may, on account of the consequent danger, become important, and may even be misunderstood in *post-mortem* examinations; it is paralysis of the placental portion of the uterus, occurring at the same time that the surrounding parts go through the ordinary processes of reduction. It induces a very peculiar appearance. The part which gave attachment to the placenta is forced into the cavity of the uterus *by the contraction of the surrounding tissue*, so as to project in the shape of a conical tumour, and a slight indentation is noticed at the corresponding point of the external uterine surface." Whether the words which we have placed in italics represent or not the real cause of the first stage of displacement, is a question not as yet definitely settled. Matthews Duncan, in his essay on this subject, maintains that the uterus cannot itself effect introcession, and that it must, on that account, in every instance, be commenced by a force external to the uterus. In the case of dragging upon the cord, we have a force of this kind acting from below, and, as regards spontaneous inversion, he assumes that we have a cause of a similar nature acting from above in the mechanical conditions of the abdomen, which are called into play, and which take the effective form of what is familiarly known as "bearing-down" effort.

Whatever may be the view entertained as to the initiatory process by which spontaneous uterine inversion is effected, numerous authentic facts attest that such an occurrence takes place by the operation of causes which may be at once abnormal and spontaneous. So soon as the stage of depression has been established, as represented in Fig. 148, the further progress of the case admits of easy explanation. The analogy which at this stage exists between inversion and an ordinary case of "hour-glass" contraction has not failed to attract the attention of many of the more eminent writers on this subject. In both, we find

the region of the fundus in an abnormal condition of atony, but the parts below are in a state of more or less efficient contraction. A stimulus to sustained and active contraction is afforded by the presence within the cavity of a tumour. "The annular contraction of the body of the uterus grasps," says Tyler Smith, "the introcedent fundus as it would a foreign body, and carries it downwards for expulsion through the os uteri, the os itself being at this time either in a state of inertia, or actively dilated, just as at the end of the second stage of labour. After the inverted uterus has passed through the dilated os uteri, this part of the organ becomes contracted, preventing re-inversion from taking place. Thus there is, first, the depression of the fundus uteri, with annular or hour-glass contraction of the body of the uterus, and dilatation of the os uteri. Next, there is intus-susception of the fundus by the body of the uterus. Lastly, complete inversion occurs, with contraction of the os uteri upon the inverted organ. If we wished to describe this action in three words, they would be—introcession—intus-susception—inversion." (See Figs. 149, 150).

It must not be supposed that, by thus supporting the doctrine of spontaneous inversion, the production of the accident by artificial or violent causes is ignored; still less, that any support is given by implication to the improper practice of pulling upon the cord with the view of effecting separation of the placenta. It will be inferred from what has already been said, that there are two classes of cases, in one of which the uterus is completely, and in the other partially paralyzed. Inertia, therefore, in some form or another, is an essential concomitant of all cases of inversion. In complete atony of the organ, uterine activity can take no part in the displacement, although bearing-down or abdominal effort may; but, in the other variety, where, as has been shown, local paralysis has its usual seat about the fundus, uterine effort is the efficient cause in all cases of spontaneous inversion, and, in those in which the displacement is artificially produced, there is every reason to believe that there must be, so to speak, a consenting action on the part of the uterus, which then acts in unison with the force which is applied. If any further evidence were held to be necessary to establish the fact of such an occurrence, it is to be found in the instances which have been put on record of *post-mortem* inversion, which can only thus be satisfactorily explained.

Symptoms.—Inversion generally takes place shortly after the birth of the child, often before the placenta has been expelled. The patient being thus under the immediate observation of the accoucheur at the moment of the occurrence of the accident, the first symptom which will in all probability attract his attention is a condition indicating shock,

out of all proportion to the circumstances even of a lingering or exhausting labour. The violence of the shock, and the disturbance of the nervous system which accompanies it, bear no relation to the degree of the inversion. We would naturally expect that, in the stage of depression or introcession, the symptoms would not be so severe as in the more advanced stages, but in practice this is not found to be the case. The degree of constitutional disturbance depends, however, in a great measure, upon the amount of hæmorrhage, and this again upon the extent to which the placenta has become separated. In all cases in which complete separation of the placenta may have occurred, the hæmorrhage is alarming, and may be so severe as to place the life of the patient within a few minutes in most imminent peril. But, if the contraction of the cervix is firm, it may be by this in some measure controlled.

The occurrence of such symptoms is accompanied by an unusual condition of parts, as examined through the abdominal walls. In the stage of depression, we may feel the outline of the uterus, but it is no longer a spheroid, for its centre presents a cup-like depression which can be distinctly felt by the fingers. In the more advanced stage, however, the hard tumour which the uterus should in normal circumstances form behind the pubes is absent, nor is there in its place any such condition of general tumidity as might indicate a flaccid organ distended with blood. The uterus has, in fact, passed beyond the reach of the fingers in this direction. If we now make a vaginal examination, the nature of the case is at once revealed. A firm rounded tumour is here felt, which may even protrude externally. If to this the placenta is still partially or entirely adherent, there is of course no possibility of error, but when the placenta has become separated, no inconsiderable perplexity and difficulty may arise.

Polypoid Myoma Distinguished.—The distinction between a polypoid myoma and a partial inversion has already been alluded to under the head of post-partum hæmorrhage. In addition to what was then remarked, we need only observe here that, in some cases, the sense of touch affords little reliable information, as there is in this respect such variety in the texture both of polypi and inverted uteri, that the most skilled observer could scarcely by this alone distinguish between the two. The really important point in diagnosis is this, that polypi, owing to the narrowness and length of the pedicle, can generally be moved much more freely, and may be twisted to a greater extent on their long axis without giving rise to any particular pain, while the uterine sound can be passed for the usual distance. Any attempt which may, on the other hand, be made to twist the tumour which is

formed by an inverted uterus, is attended with considerable pain, and can, moreover, be effected only within the narrowest limits, while the point of the sound is arrested at a short distance from the os. If there is any inherent contractility in the tumour, this at once shows that it is the uterus. If the inversion is complete, the continuity of the vagina with the lateral walls of the tumour enables us by the finger to recognise the nature of the case; but, when the intus-suscepted fundus is tightly grasped by the os and its diameter at this point thereby reduced, the resemblance to a polypus is greatest, and it is here that the tests above mentioned may be most usefully applied. The nature of the case may be still more conclusively demonstrated by such modes of examination as may prove the absence of the uterus from its normal situation. On this point, Barnes recommends that we should pass one or two fingers into the vagina to the root of the tumour, and then press down the fingers of the other hand behind the symphysis. If in doing this we can make the fingers meet, and feel from the outside the funnel of the inverted uterus, our diagnosis will be confirmed. Or, again, we may pass a finger into the rectum so as to get its point above the root of the tumour, and then pass a sound into the bladder, with its point turned backwards, so as to meet the finger in the rectum, which, if it can be effected, will equally show that the uterus is absent from its usual situation, and consequently, by inference, that the tumour in the vagina is the uterus.

The symptoms above enumerated are those of an ordinary case of uterine inversion, occurring in the course of labour, and do not apply in all respects to the other and rarer varieties. Assuming it for the moment as proved that inversion of the unimpregnated organ is a possible occurrence, it is undoubtedly so rare that little or nothing can be said as to its symptoms, but we may assume that hæmorrhage, pain, and nervous shock will be among them, and that the diagnosis may be unusually difficult. There are cases, again, in which the presence of a polypus is established, and yet inversion may occur, the two conditions thus co-existing, although the former has in all probability been the direct cause of the latter. And there are yet other instances in which inversion may succeed delivery, and yet not follow so closely upon it as it usually does. In such the initiatory stage of depression has probably been produced during labour, and this again has been transformed into one or other of the more advanced stages, by irregular contractions or modifications of what are known as after-pains. It would appear as if occasionally the symptoms, at the time of the inversion, were not so marked as usual, for there can be no doubt that the accident has sometimes been altogether overlooked at the time of labour, and only discovered long

after. When the woman recovers from the immediate effects of inversion, she may regain her health and strength as if nothing ailed her, and be able to follow her ordinary avocations. But in such cases, the original symptom of hæmorrhage will, sooner or later, return, and by its periodic recurrence—corresponding often, as might be anticipated, to catamenial periods—sap the strength and undermine the health of the patient. These constitute cases of Chronic Inversion.

Treatment.—Whatever the stage may be at which inversion of the uterus is recognised, our duty is to reduce the dislocation of the fundus without unnecessary delay. If we were fortunate enough to discover what has happened immediately, there would probably be but little difficulty in effecting the reposition, as we would then find the os in a state of relaxation. This period is, however, of brief duration, and is followed by contraction of the os, which grasps the organ firmly, and in this way adds very greatly to the difficulty of the operation.

If the placenta is still adherent, it is a question whether we should at once separate it. The advantage of the procedure is, that the fundus will undoubtedly be more easily reduced than when its bulk is increased by the presence in its immediate neighbourhood of the mass of the placenta, while, on the other hand, the obvious disadvantage of separation is to encourage hæmorrhage by rupturing the utero-placental vessels. Both methods of treatment have been adopted, but it is certain that neither of them can be held as appropriate to all cases. Reposition along with the placenta is, in fact, only applicable to those cases in which the os is relaxed, and is all but impracticable in the other class of cases, where we may find it difficult enough to return the fundus alone through the stricture formed by the os, while if the placenta be adherent—and more particularly if morbidly adherent—we should, if possible, return the whole mass.

The method which is usually recommended is to introduce a couple of fingers into the vagina, and to press firmly on the centre of the displaced fundus, which is by this means to be steadily pushed upwards in the axis of the pelvis, so as to carry the fundus through the ring formed by the contracted os. Undue violence must of course be avoided, while the parts are to be extended by pressure and manipulation through the abdominal walls. So soon as the fundus passes through the os in the process of re-inversion, it must be followed upwards by the finger, to render the operation complete. Nœgerath's method, which is approved of by some, is a modification of this, and consists in pressure, not on the fundus of the inverted organ but towards the side, while others imitate the process for the reduction of a hernia by compressing

the tumour laterally, and returning the cervix first and the fundus afterwards.

When a certain time, even a single hour, has elapsed since the displacement has taken place, the difficulties of the operation may be considerably increased, and when this has extended to days, it will naturally become more difficult still. The effect of the strangulation of the neck of the tumour is to cause general tumefaction of the parts beneath, so that it will often be necessary to compress the organ from side to side, in order to curtail its dimensions in that direction before attempting actual reduction. By this manœuvre a difficulty, which may at first seem insuperable, will sometimes be overcome. By the ordinary procedure by means of the fingers, the reposition of the uterus has been found by some operators to be so difficult that instruments have been used which, being of less bulk, are presumed to offer certain mechanical advantages. Of such a nature is the *bâton repoussoir* of Depaul, and an instrument suggested by Dr. Aveling, which he describes as a "cupped sigmoid repositor,"[1] but to these it may fairly be objected that the gain is probably more than counterbalanced by increased risk, and it must be confessed, in this as in many other operations in midwifery, that the more experienced and skilful the accoucheur, the more does he prefer his fingers to mechanical aids, however ingenious.

When the fundus has passed to a certain distance within the os, it has very frequently been observed that the same muscular action of the uterus which originally contributed to the dislocation of the organ now comes into play as an auxiliary to reposition, and it is not uncommonly observed that the ultimate complete restitution of the fundus is effected by a sudden jerk or snap, which is often quite audible to the bystanders. In those instances, however, in which inertia of the organ is persistent, it will be necessary to pass the hand quite within the cavity, until we are convinced that its anatomical relations are completely re-established. Nor is it proper, at this moment, and at once, to withdraw the hand. We should rather act here as we would do in a case of encysted placenta, or of post-partum hæmorrhage, in which the hand is introduced for the removal of the uterine contents; and it is, therefore, advisable to allow it to remain in contact with the uterine walls, and to act with the other hand, in concert with it, through the abdominal walls, so as to excite the organ to efficient and symmetrical contraction, which is a safeguard both against hæmorrhage and a repetition of the displacement.

Chronic Inversion.—There is another class of case, in which the difficulties are still more formidable than any which have hitherto been

[1] See British Medical Journal. March 13, 1886.

described. It may be assumed that the longer the standing of the case the more serious will be the obstacles to reduction, until it reaches the condition to which the name Chronic Inversion has been given. It was at one time generally supposed that, when even a few hours had been permitted to elapse, inversion might be looked upon as almost irreducible. The results of modern practice have, however, clearly demonstrated that such an idea is quite untenable, and it may now be confidently asserted, that no condition short of inflammatory adhesion of the parts will warrant such a conclusion, whatever the duration of the case may be. The great point to be kept before us, and against which all operative effort is to be directed, is the contracted state of the os. However hopeless, therefore, on a cursory examination, the case may seem to be, we may anticipate with some confidence that *sustained* effort will, in the end, overcome the resistance. But, to be effectual, it must be continuous, and we have only to reflect upon the fact that Tyler Smith succeeded thus in reducing an inverted uterus of ten years' standing, and that a number of cases are on record of a similar kind, to encourage us, even under the most unpromising circumstances, in diligent and untiring effort.

Pressure effected by means of the hand of the operator, although perfectly safe, cannot be maintained for a sufficiently long period, and is thus inapplicable to the class of cases which we are now considering. The very obvious danger which would attend the use of any solid material, has led to the employment of air or water bags, which are to be introduced into the vagina, and gradually distended. This elastic pressure is, when properly applied, perfectly safe, and can usually be borne by the woman without much uneasiness. In Tyler Smith's case, above referred to, the details of which will be found in the Medico-Chirurgical Transactions for 1858, the pressure was kept up for more than a week, while, in many other cases, a similar process has been attended with equally satisfactory results. The mode of action in these seems to be that continuous although indirect pressure is thus brought to bear upon the os. At first this is as ineffectual, or even more so, than the previous efforts which have already been made with the view of effecting reduction by manual interference; but, in the end, the long-continued pressure wears out the spasm, the os yields, and re-inversion occurs.

In those instances in which it is said that the organ has been spontaneously restored to its normal condition, as in a case narrated by Baudelocque, it is certain that a spontaneous relaxation of the os must have occurred, and it is probable that, along with this, the inverted organ had been subjected to some pressure in its new situation from

permanent or temporary causes. The theory that a spontaneous reduction may take place in consequence of tonic contraction of the Fallopian tubes and of the broad or round ligaments, appears to us to be in the highest degree improbable. The condition, of all others, essential to replacement is, we repeat, relaxation of the os. There may be cases, however, in which even sustained elastic pressure may fail to effect the object which we have in view, although we have every reason to believe that such must be of rare occurrence. But, even under such circumstances, our resources are far from being exhausted, and various methods have been adopted for overcoming the difficulty in individual cases, which it would be impossible to describe here. The idea of section of the constriction must have often suggested itself; but Dr. Barnes was probably the first to carry a case to a successful termination by this operation.[1] The proceeding, as described by him, is as follows:—"Draw down the uterine tumour by means of a loop of tape slung round the body, so as to put the neck of the tumour upon the stretch; then, with a bistoury, make a longitudinal incision about half an inch long, and a quarter of an inch deep, on either side, into the constricting os; then re-apply the elastic pressure. Next day, try the taxis, and re-apply the elastic pressure if necessary. Elastic pressure alone, or aided by this operation, will, I am convinced, overcome every case of inversion, except when fixed by inflammatory adhesions." Another, and probably a safer, process has also been suggested, by which the incisions in the os are increased in number, but made much more superficial. Professor Thomas has proposed and successfully practised in these exceptional cases, a plan which consists in making an opening in the abdominal wall, inserting an instrument resembling a glove stretcher, and thereby overcoming the resistance, while the hand in the vagina acts in unison with the instrument acting from within.

Cases have been met with in which menstruation has gone on regularly from the surface of an inverted uterus; and, indeed, observation of such instances has thrown some light upon the source of the menstrual discharge. In such cases, leucorrhœa, and the presence of a tumour within the vagina, may be the only symptoms, but the almost invariable rule is repeated flooding, and that to such an extent as to bring the patient into a condition of immediate danger. Failing all the means already detailed—in which we may assume that full advantage has been taken of anæsthetic agents, which are invaluable in all cases of uterine spasm—is there any other method which we may adopt for the relief of a woman who may be dying before our eyes from the effects of this accident?

[1] Medico-Chirurgical Transactions. 1869.

Removal of Uterus.—The only possible remedy in such a case is removal of the inverted uterus, as this alone can be expected effectually to check the hæmorrhage. The objections to such a procedure are sufficiently manifest, for not only is the case one of mutilation by which the woman is unsexed, but it is one the immediate risk of which is very great. Still, the operation has been performed with success, and the woman has enjoyed perfect health for many years thereafter. In the only case which has come under our observation, the patient, who was operated upon many years ago, is still alive, and in perfect health; and it is worth remarking, in addition, that she never menstruated after the operation, but that the menstrual molimen, which regularly occurred for some years, was apparently relieved by periodical or vicarious leucorrhœa. When, therefore, the doom of a patient seems fixed if we decline to interfere, we should have no hesitation in resorting to a measure so extreme as the removal of the organ; and, of course, at the present day the operator would select the écraseur in preference to the older methods of ligature or excision. The best instrument for the purpose is the wire rope écraseur of Braxton Hicks, which may be used either with fine wire twisted into a rope, as recommended by the inventor, or with a single strong wire. The responsibility which attaches to an operation such as this cannot fail to weigh upon the operator, and he will, therefore, at once recognise the necessity, before finally committing himself to this course, of making himself sure on two points:—first, as to the accuracy of his diagnosis; and, second, that the tumour is beyond all doubt irreducible.

CHAPTER XXVI.

RUPTURE OF THE UTERUS.

*Rupture during Pregnancy or during Labour.—Partial or Incomplete Rupture.—Site, Extent, and Direction of the Laceration.—Reason of the Comparative Frequency of Cervical Rupture: Views of Bandl.—Causes—*A. *Mechanical: Sex; Pelvic Deformity; Faulty Presentation; Operative Violence; Ergot; Violent Uterine Action.*—B. *Reflex: Excitement of Cervix, &c.*—C. *Pathological: Cancer; Rigidity of the Os; Atrophy; Softening; Fatty Degeneration.—Premonitory Symptoms.—Symptoms of Rupture: Pain; Hæmorrhage; Shock; Recession of the Presenting Part.—Lacerations involving the Vagina.—Treatment.—Preventive Measures.—Delivery by the Forceps or by Perforation.—Extraction of the Placenta.—Treatment, if Fœtus has escaped into the Peritoneal Cavity.—Further Management of the Case.—Treatment of Rupture of the Uterus during Pregnancy.*

RUPTURE of the Uterus, at all times one of the most appalling accidents of Midwifery, is also the most fatal, and is the more terrible, as in many cases it can neither be forseen nor averted. The elaborate statistics for which we are indebted to Dr. Churchill, show the accident to have occurred in 85 out of 113,138 cases of labour—about 1 in 1,331. Although it is almost always during labour that rupture occurs, it is not invariably so, and a certain number of well authenticated cases are recorded, in which rupture occurred at various periods in the course of pregnancy, in the absence of any uterine action whatever. Some of these cases have been the result of violence, and a considerable number seem to have followed over-exertion of some kind. But there are others in which no such cause can have been in operation, as in a case published in the Medical Repository by Mr. Scott of Bromley, in which a woman, in the sixth month, was awakened from sleep by a sudden pain about the umbilicus, which was soon succeeded by collapse and death. On examination after death, a rupture was discovered at

the fundus, through which the fœtus, enveloped in its membranes, had escaped into the abdominal cavity. It would probably be impossible in many of these cases, to distinguish between this accident and rupture of the sac of an extra-uterine pregnancy, as the symptoms are almost identical. The very rarity of spontaneous rupture has not unfrequently given rise to suspicion of foul play in such cases, and the question has, therefore, a medico-legal significance, in reference chiefly to criminal abortion; but there will probably be little difficulty in recognising a rupture occurring spontaneously in the course of pregnancy, seeing that it generally occurs at the fundus, while criminal injuries are more frequently discovered in the region of the os and cervix. Besides, the nature of the injury is so different, that the appearance of a spontaneous rent and a violent laceration could scarcely be mistaken; and, moreover, there often is to be found, as the cause of these ruptures, a diseased condition of the structures of the womb. Ruptures during the course of pregnancy may occur as early as the third month, but are more frequent, the more advanced is the development of the fœtus.

Rupture during Labour.—By far the greater number of cases occur during labour, and it is to these that attention must be more particularly directed. The laceration generally involves the entire thickness of the uterine walls, but there are exceptions to this rule. In some, the rent is found to have extended through the mucous membrane and proper tissue of the uterus, and to have been arrested by the peritoneum, which remains intact. The mobility of the peritoneum upon the subjacent uterine tissue in some measure encourages this; and it is, therefore, at the lower portion, where the connection of the peritoneum is looser, that this has been more frequently observed. The result of such cases, although often fatal, is not so much to be despaired of as when the laceration is complete; but a very probable result would be the effusion of blood between the peritoneum and the tissues beneath, and the consequent formation of peri-uterine hæmatocele. In these instances, it is most likely that the fact of laceration is not recognised at all at the time of its occurrence. Another rare variety of rupture consists in numerous fissured lacerations of the external surface of the tissue proper of the uterus, immediately beneath the peritoneum, which may give rise as in the other case, to sub-peritoneal hæmorrhage; while, in other instances, the peritoneum itself is the only part which is lacerated, the other tissues escaping altogether.

Any part of the uterus may be the seat of laceration, while the rent in the tissues may take any direction, and, in extent, may be limited

only by the size of the organ itself. It may thus be either longitudinal or transverse, and may, in the first case, correspond to the entire length of the uterus, while, in the latter, the laceration may extend completely around the uterus, thus dividing it into two. Both of these are extreme cases: the rent is generally much more limited in extent. Considerably more than half of all the ruptures at the full time occur in the region of the cervix, generally near the junction between the uterus and the vagina, or in the lower part of the ring of Bandl. Next in point of frequency comes the body; and last of all, the fundus, which is, as we have seen, the site preferred in early pregnancy. One of the most remarkable monographs on this subject is one which was published, in 1848, in the American Journal of Medical Science, by Dr. James D. Trask, and is based on an analysis of over four hundred cases. The following represents the proportion of cases in the various situations named, as deduced from his statistics:—

Ruptures of the	Cervix, ...	55 per cent.
,,	Body, ...	36 ,,
,,	Fundus, ...	9 ,,

The reason of the comparative frequency of rupture at the cervix is to some extent afforded by a consideration of the mechanism of the dilatation of the os, which has been fully detailed in reference to the progress of the first stage of labour. The os, as was explained, is dilated by the combined action of the longitudinal fibres of the uterus and the bag of waters, or, in the absence of the latter, by the presenting part of the child; so that we cannot wonder that the usual seat of rupture is where the greatest amount of force is brought to bear. The most complete and satisfactory explanation of the phenomenon is, however, that of Bandl,[1] who ascribes the cause to an abnormal thinning of the lower segment of the womb below the ring which bears his name. This thinning, he shows, is, within certain limits, a normal process so long as it does not extend upwards beyond the level of the brim. But should the attenuation process go so far as to allow of the ring of Bandl being felt about a hand's breadth above the brim, the patient may be considered in a condition of danger requiring prompt treatment, otherwise this thin segment is remaining in a condition liable to rupture at any moment. The direction of the rent seems to be mainly determined by the direction of the circular fibres of the cervix, as it is for the most part transverse. In other cases, again, it takes a longitudinal direction; while, in a third class, of which there are illustrations in pathological museums, the rent is rectangular, as

[1] Ueber Ruptur der Gebärmutter. Wein, 1875.

might occur in cloth, the two groups of fibres, circular and longitudinal, representing, as it were, the warp and the woof.

Trifling ruptures of the vaginal portion of the cervix, commencing at its margin, are among the most common of the minor accidents of midwifery. But, even when lacerations of this part are more extensive, the rent does not necessarily involve the peritoneum, so that the gravity of the case will depend chiefly upon whether or not that membrane is injured. In some rare instances, the laceration extends into the bladder, and in others, rarer still, the whole vaginal portion of the cervix has been separated in the form of a ring born with the child. These lacerations of the cervix alone are very common, and generally take a vertical direction. They are said to occur more frequently on the left than on the right side.

It was at one time generally supposed, and it is even now stated by many writers, that there is less liability to rupture in first than in subsequent pregnancies. The statistics of Churchill and Trask seem to show that this is not the case; but, on the other hand, Bandl adheres to the older view, founding his belief on the assumption that the resistance of the round ligaments is greater in primiparæ, and that the recession of the ring which bears his name, which he supposes to be preliminary to rupture, is in this way prevented. Another view, all but universally held, was that the accident was a common result of protracted labour; and it is, indeed, not unnatural to suppose that this should be the case; but there is, perhaps, no one point which is brought out more strikingly in Dr. Trask's cases than that the actual duration of labour has little or nothing to do with it. In 104 out of 147 cases rupture occurred within twenty-four hours of the commencement of labour. It must, however, be remembered that the usual issue of a protracted case is failure of the pains; so that, although we may fairly assume that long-continued effort would endanger tissues weakened by exhaustion, nature here arrests the pains, and thus interposes for the protection of the parts, vigorous action being only restored when she has had time to recruit her exhausted powers.

Causes.—Whatever views may be entertained in regard to the two conditions above alluded to, there can be no doubt that anything which mechanically impedes the course of labour is an undoubted cause of rupture of the uterus. The sex of the child thus plays, as might be expected, an important part, as is shown by the statistics of the Dublin Lying-in Hospital, extending over a long period, from which it would appear that, in nearly 70 per cent. of all the cases of rupture, the sex was male. Trask's cases show, no less clearly, that pelvic deformity or disproportion is another important cause, which had been proved to

exist in 74·74 per cent. of his cases. For the same reason, faulty presentations, which are an impediment to labour, may be the direct cause of uterine rupture; thus, in 303 cases given by Trask, of all presentations, 16 were presentations of the shoulder. Forcible compression of the neck of the womb between the head of the child and the pelvic walls was supposed by Dr. Murphy to play an important part in inducing rupture of the womb, so that if it is pinched anteriorly against the ilio-pectineal line, or posteriorly upon the promontory of the sacrum, anterior or posterior lacerations of the cervix are to be explained by the mechanical action of the longitudinal fibres.

Operative Violence.—Although we have every reason to believe that the more accurate knowledge of modern times has had a marked effect upon the results of modern practice, it must still be admitted that operative violence cannot be overlooked as a cause of rupture of the uterus. We do not here refer to such cases as occur in consequence of causes of a pathological nature, to which we shall again advert, where the accoucheur is often unjustly blamed, but to those in which errors of judgment, or rashness in operative procedure, lead to this disastrous result. The most common of all midwifery operations, for example, may, in any case, be attended with extensive laceration, for, if we apply the forceps without due consideration and careful observation of the state of the os, we may readily rend those tissues and destroy our patient. In the same way, clumsy manipulation in turning—more particularly when, the liquor amnii having escaped, the uterus is firmly contracted upon the child—may, at any stage of that operation, in a moment plunge a satisfactory case into the category of hopelessness; and so, in many different ways, operative incompetency may, in the attempt to shield the woman from danger, only precipitate her doom.

Ergot.—The improper administration of ergot has, there is only too good reason to believe, been attended with a similar result in no insignificant number of cases, where that powerful drug has been given without reference to the amount of mechanical resistance which had to be overcome; and we rather think that, if the truth were known—which, for obvious reasons, is often withheld—this, as a cause of uterine rupture, would stand prominently forward. Professor Bedford of New York has in his museum four preparations of ruptured uteri caused by the improper use of ergot. A preternatural violence in the uterine contractions, even when associated with no marked resistance beyond what is perfectly normal, may also induce rupture by the actual impetuosity of the propulsive effort; but such cases, in the absence of morbid excitement of some kind, are probably very rare. When such

morbid excitability does exist, it is astonishing, however, by what trifling causes violent action may be set up. It is by no means rare, that the slight irritation of the cervix which occurs in the course of an ordinary vaginal examination, arouses, by a reflex act, an amount of expulsive effort which may thus lead to rupture from a cause apparently so simple. Examples of this kind have been from time to time recorded, but cases which are centric in their origin are, undoubtedly, of far more frequent occurrence. Rupture has occasionally taken place, or has been extended, during straining at stool.

Pathological Causes.—Special attention has been directed to certain pathological conditions, upon which there can be no doubt that rupture of the uterus occasionally depends. It is in these cases mainly that, in the most skilful hands, and with every possible attention, rupture quite unexpectedly occurs, and in such the practitioner may be cruelly and unjustly blamed. This, indeed, is by no means the least important of the considerations which invest this part of the subject with a special interest. Some of the pathological conditions referred to also act, like the class of cases already mentioned, mechanically. Of this nature is cancer of the uterus, which generally attacks the os and cervix, and unfortunately, in some instances, proves no bar to conception. The nature of the disease, even when it has not passed to the more advanced stages, renders the affected tissues so undilatable, that laceration, under the influence of efficient uterine contraction, is almost inevitable; and, in more extreme cases, the only safeguard may be Craniotomy or the Cæsarian Section. Cases of extreme rigidity of the os, and of the more external parts of the parturient canal, are by no means of rare occurrence in practice, and, if they should chance to be accompanied with, or complicated by, violent uterine effort, rupture may not unlikely occur. There are, however, other conditions in which laceration may take place quite independently of excessive muscular action, or even in the absence of such action, as the history of uterine ruptures during pregnancy and before labour seems to show, and the interesting researches of Dr. Murphy at the Dublin Lying-in Hospital, clearly demonstrate. "Thinning, or partial atrophy of the uterus, is not an unfrequent cause," says Dr. Murphy; "four examples of this morbid change presented themselves to our notice. . . . . When a change of this kind takes place, the symptoms are often very obscure. There may be a very severe laceration without any severe pains, or any of those prominent symptoms that often precede the accident. You can appreciate what would be the effect of ergot of rye, if it were given to increase pains rendered feeble from this morbid condition of the uterus. Softening is another pathological cause of laceration. The

fibrous tissue seems to be the first tissue affected; the mucous membrane may then be involved, but the peritoneum generally escapes. This morbid change may be only slight, affecting a few of the uterine fibres; or it may be extensive, converting the affected portion of the uterus into a putrid mass. Thus we have found a kind of aneurismal sac formed in the parietes of the uterus, in consequence of a partial rupture of the uterine fibres; no symptoms of laceration showed themselves during labour, nor did any appear until several hours afterwards, when the sac burst. In the same manner may be explained some of those obscure cases of sudden and fatal hæmorrhage some days after delivery. Dr. Collins relates one in which the patient was seized with violent flooding on the fifth day after delivery. She died in an hour; and on dissection, it was discovered that a patch of the uterus, of about the size of a shilling, had given way, corresponding to the projection of the sacrum."

Recent observations tend to show that that process of fatty degeneration which, as we have shown, is so essential a phenomenon of the normal process of involution (see Fig. 144), sometimes takes place prematurely; and, if so, it can be readily understood how such an occurrence—under the circumstances, of course, a pathological one—must essentially contribute to the risk of rupture. And there can be little doubt, as Tyler Smith observes, "that in cases where the uterus is feebly developed, or weakened by disease and exhausted action, the contractions of the abdominal muscles must contribute to the rupture of the organ, by urging the head or presenting part of the child through the os uteri."

Symptoms.—The causes of rupture of the uterus being so various, it will excite no astonishment that the symptoms are far from being uniform. Very violent and tetanic uterine contraction, under circumstances which, for the time at least, render it impossible that labour can make much progress, will always excite our apprehension, and may seem to call for such means as we have at our command for moderating excessive action. But, the powers of nature are such that, even in the most unpromising circumstances, the dreaded result seldom ensues. The significance of the premonitory symptoms is, however, greatly increased if, along with contractions of this nature, the woman complains of pain of an unusual intensity; and, if the site of such pain should correspond to a point where it had been complained of before labour, our fears will be proportionally increased. We cannot, however, trust to premonitory symptoms. Indeed, in the great majority of cases, we have not even the benefit of such obscure signs as have been mentioned, and thus the climax of the case is attained while we are

quite unprepared for a casualty so dreadful, unless, indeed, we may have been able to feel the ring of Bandl high above the pubes.

Shock.—As a general rule, the symptoms which denote actual rupture of the uterus are well marked. At the height of a pain, a sudden and excruciating pang may occur. This is sometimes accompanied with a sound which may be audible to the patient and to those about her. The pain suddenly ceases, and is almost instantly followed by alarming prostration and shock, which is modified, more or less, by the characteristic symptoms of hæmorrhage. This may be altogether internal, or may be indicated by a gush of blood from the vagina, according to the portion of the uterus which has been the seat of the rupture. The countenance becomes pallid, with a fearful expression of alarm and anxiety; the face is bedewed with a clammy sweat, and the extremities and general surface become cold. The stomach ejects its contents, and at once throws off anything which may be swallowed, and it has sometimes been noticed, after protracted retching, that the matter vomited is of the colour and appearance of coffee-grounds. The respiration becomes laboured, and the pulse rapid, feeble, irregular, and ultimately imperceptible. Simultaneously with these symptoms, the signs of the life of the fœtus disappear. In some cases, the occurrence of rupture is not marked either by acute pain or by the other symptoms above enumerated, and the dangerous condition of the patient may only become apparent after a considerable period has elapsed—it may be hours, or even days. These are, for the most part, cases in which the rent is comparatively trifling in extent; and, if it should so happen that the entire thickness of the uterine tissues has not been involved, the ordinary expulsive contractions may go on, although probably modified in degree.

Recession of Head.—A very usual and significant symptom is recession of the head of the child, which may have come to press on the perineum, or even to distend the vulva. If along with symptoms such as have been described, the head suddenly recedes towards the upper part of the pelvis or passes beyond the reach of the finger, we can have little doubt as to the nature of the occurrence. We must here warn the young practitioner against an error into which he may fall, and which may cause him a considerable amount of unnecessary anxiety; for it not unfrequently happens, towards the termination of the second stage of labour, that the head suddenly and unexpectedly recedes, on the termination of a pain, to a much greater extent than is usual. Such an occurrence, however, need cause no alarm, as it is due to a mere temporary relaxation of the uterine walls, and is usually the forerunner of more efficient contractile efforts, under the influence of which

the child is rapidly brought into the world. Complete recession of the presenting part, in rupture of the uterus, usually indicates that the child has passed or is passing through the uterine walls into the cavity of the abdomen, through the parietes of which the various parts of the child may be distinguished. In some cases, it would appear that the sudden cessation of labour pains was the only symptom of any importance, and it is worth remembering that this has been mistaken for inertia, and ergot administered.

Vaginal Laceration.—There is a class of case which, although not constituting a rupture of the uterus, has so important an analogy to the latter that it seems proper to mention the subject here. These are ruptures or lacerations of the vagina. Lacerations of the vagina are usually situated in its posterior wall, and, when in the lower part, are sometimes complicated by rupture of the perineum more or less extensive. There are instances, however, in which the rupture of tissue is very extensive in so far as the vagina is concerned, and in which, nevertheless, the external tissues of the perineum remain quite uninjured, such cases proving both tedious and troublesome, although, as compared with rupture of the uterus, they are comparatively free from danger. The lacerations to which allusion is here more particularly made, in reference to uterine rupture, are those in which the head of the fœtus, after passing the os, pinches in and compresses a zone of the vagina. The uterus in its contractile efforts pulls upon this fixed ring, precisely as happens when the cervix is similarly compressed, the result being a tear which is transverse in its direction and may extend circularly around the entire vagina. It is important to know that, in such cases, the whole of the uterus with the upper part of the vagina has been expelled by the natural efforts, giving rise to a charge of malapraxis. It has been denied by some that the uterus could in this way rend its ligaments, but recorded and perfectly authentic cases now clearly show that not only may the round and broad ligaments be torn asunder in this way, but that they may even be ruptured as a mechanical effect of spontaneous inversion. Lacerations involving both vagina and uterus are not uncommon, and it is probably difficult in some of these instances to determine for certain in which of the two textures the rupture has had its origin; but there can be no doubt that lacerations, either of the cervix uteri or of the upper part of the vagina, must, in consequence of their intimate anatomical relations, be very apt to extend from the one to the other. A considerable hæmorrhage could scarcely fail in such cases to be a prominent symptom.

The most serious cases of rupture of the vagina are those in which

the rent occurs in the region immediately behind the os, as this involves a communication with the cavity of the peritoneum. Recently, particular attention has been called to this accident by Dr. Galabin and others,[1] and cases are recorded in which the child and placenta have passed through an aperture in this situation, the tissues of the womb remaining intact.

Treatment.—It is scarcely necessary to observe that, if there be any possible means whereby we may succeed in preventing this accident, such must necessarily be by far the most important point relative to treatment. But, unfortunately, the indications which demand preventive treatment are so obscure in their nature that it is difficult to tell, on the one hand, whether we are called upon to interfere, and, on the other, whether, having interfered, the safety of the patient may fairly be attributed to our conduct in the case. The latter point is perhaps the most difficult of all. We recognise, let us suppose, a serious mechanical impediment to delivery, which co-exists with violent and long-continued uterine effort, and which may seem to imperil the integrity of the uterine tissues. We operate, by the forceps, turning, or otherwise, and speedily relieve the patient; but when are we entitled to say that such prompt and decisive action on our part has actually averted a great calamity? We may, indeed, be perfectly certain that a well-considered and definite plan of treatment, in accordance with which operative assistance is afforded or withheld, will reduce rupture of the uterus to a minimum, as is well shown by the statistics of large lying-in hospitals, where this accident is rarely met with. It cannot, however, on the other hand, be doubtful that a needless dread of rupture, which inexperience is certain to exaggerate, leads in some instances to operative interference, which may be perfectly unnecessary, although the operator does not fail to congratulate himself on a fortunate issue, which he fancies to be due to his prescience and skill.

Apart from this, there are, however, certain conditions upon which an intelligent preventive treatment may be founded. The occurrence, for example, in the course of gestation, of acute pain, referrible to some particular part of the uterus, has often been known to precede rupture in the part affected, which is believed in these instances to have been the seat of local or limited metritis. Should any suspicion, therefore, of this be entertained, it will be proper to adopt such means as may seem suitable with the view of subduing the morbid action which is assumed to exist. One, and by no means the least important, of the objects which the accoucheur has in view in inducing premature labour in cases in which there must be disproportion of parts at the full time,

[1] See Transactions of the Obstetrical Society. London, 1878.

is to avert the danger of rupture which fruitless uterine effort might in any case produce. And he will, in like manner, feel himself impelled to prompt and energetic action, when the expulsive effort of the uterus is morbidly in excess. In some of these cases, the contractions attain a tetanic violence, which seems at every moment to imperil the integrity of the uterine tissues; and, if the period should not have arrived at which we may assist delivery by artificial means, we must then have recourse to such treatment as may subdue this violence—of which opium, chloroform, and chloral hydrate are, in these days, the most familiar examples. In certain cases of extreme urgency, it may be necessary to enlarge the orifice of the vagina by lateral incision of the perineum; and, if we are certain that the child is dead, and it is making but slow progress under very violent uterine propulsion, we are justified in lessening the bulk of the head by the operation of craniotomy. In so far as the forceps is concerned—and the remark applies with still greater force to turning—we must not be astonished if any attempt at operative assistance should excite the organ to more violent contraction still, and thus defeat its own object. What constitutes morbid or excessive uterine action can of course only be learned by experience.

The treatment of actual rupture, however desperate the circumstances may seem, calls for every possible attention, not only in the interest of the child—which may often be saved—but in that of the mother, who may, even in unpromising cases, rally from the effects of the injury and ultimately recover. We must not, therefore, accept the dictum of Smellie, that the accident is an absolutely hopeless one. All the best authorities are agreed that a speedy removal of the child affords the mother the best chance even when, the child being dead, this is done without any reference whatever to its condition other than considered as a foreign body. If the head of the child is still in the pelvic cavity, and thus within reach, it may be possible, although very rarely, to grasp and deliver it by the forceps, and it need scarcely be said that, if this can easily be effected, it ought to be preferred as the method which is at once easiest and safest. As, however, in a large proportion of such cases, rupture is associated with more or less of pelvic disproportion, the usual practice is to perforate, and then to extract by the crotchet or craniotomy forceps, after having evacuated the contents of the cranium. This operation is, under such circumstances, attended with special difficulties, which may render its performance a matter of difficulty or impossibility. Instead of being, as in most other cases, firmly held in position by the uterus, the fœtus is apt to pass upwards on the slightest pressure towards the abdominal cavity; and, if the rupture be a

transverse one, such pressure is apt to increase it; while, again, if a portion of the fœtus has already passed into the peritoneal cavity, the remainder may thus be propelled in the same direction. It has been recommended, therefore, in order to obviate these difficulties, to use the perforator so as to press the head back towards the hollow of the sacrum by directing the handles forwards as much as is possible in the direction of the sub-pubic angle. Success in any attempt such as this will be more probable if we avail ourselves of the aid of an assistant, whose duty it should be to maintain the child in the position which it occupies, by sustained and judicious pressure exercised through the abdominal walls.

If we succeed in this way in effecting delivery of the child, we may then encounter another, and probably a more serious difficulty, in the extraction of the placenta. This organ, in a large proportion of cases, will be found to have escaped through the gap in the uterine parietes into the abdominal cavity, and, if contraction has subsequently taken place to any considerable extent, the aperture may thus be so reduced that great difficulty will be encountered in any attempt to draw it down. Too much caution cannot here be observed with the view of avoiding further laceration and extension of the wound. Were we to attempt to force the hand through the opening in order to seize the placenta, this would almost certainly occur. It is better, therefore, to use the cord as an extractor, and to pull the placenta gently towards the opening until it can be seized, and then cautiously through it into the uterus and thence through the vagina. A prolapse or hernia of a portion of the intestine through the wound is by no means an unfrequent complication of such cases, and it is a matter of doubt in many instances whether we should or should not at once attempt to replace the protruding intestine. In so far as the risk of strangulation is concerned, this is a matter of trifling importance, for the usual situation and direction of the rupture, and the relation which it bears to the uterine fibres, render it a very unlikely matter that strangulation should occur; and, apart from the chance of a recurrence of the prolapse, it may fairly be doubted whether the risk of displacing the clots and again disturbing the wound will not do more harm than good, as recovery has taken place even when a considerable coil of intestine has passed through the wound and occupied the vagina.

In a very considerable proportion of cases of rupture of the uterus, it is impossible to deliver by the natural channel, on account either of pelvic deformity, contraction of the os, or escape of the child into the abdominal cavity. In the first case, our course of procedure will depend upon the degree and extent of the deformity; and, in the second, the

rigidity may possibly be overcome by the use of chloroform, or even by incision of the tissues of the os, our object being, in every case in which the child remains in the uterine cavity, to deliver, if it be possible, *per vias naturales.* But, in the third case, when the child has escaped from the uterus, and lies among the intestines in the abdominal cavity, our treatment must be essentially different. So hopeless were such cases at one time generally regarded, that some of the most eminent accoucheurs—Denman among others—recommended that we should not in any way interfere, but leave the case to nature, as it has happened that women, even under such desperate circumstances, have recovered, the child ultimately being discharged piecemeal by the ulcerative process, as in cases of extra-uterine pregnancy. In several cases in which rupture of the uterus and escape of the child into the peritoneal cavity had occurred, delivery has been effected and the woman saved by the operation of turning, the hand being passed through the rupture, the feet of the child seized and brought down, and the delivery completed in the usual way. The fortunate result of these examples gave rise to a very general impression that this was the method of treatment most suitable for such cases; but the gross results of the operation have turned out so unsatisfactory that a very general and growing belief now exists that, whatever may have been the result in rare and favourable instances, the chances of the woman are by this procedure rather diminished than increased. Dr. Barnes believes, and with some reason, that the cases alluded to were chiefly examples of rupture of the vagina, the rent of which is not contractile, and it is certain that it would scarcely be possible to deliver in this way in an ordinary case without displacing the clots, increasing the rent, and thus exposing the woman anew to the danger of increased hæmorrhage and redoubled shock. If it is to be performed at all, it seems to us to be applicable only to such cases as present a cervical rupture of considerable size, and in which the general condition of the woman is unusually favourable.

Gastrotomy.—The statistics of Dr. Trask, and the experience of later years, have very much modified the views previously entertained by competent authorities on the subject of gastrotomy in those cases of uterine rupture in which the child is in the peritoneal cavity. The dangers of such a course are manifest. There is increased shock, and the special risk which attaches to all cases in which the cavity of the peritoneum is opened; and, in addition to this, we may take into consideration the natural repugnance which is entertained by the patient's friends to such an operation, so long as another is in any way practicable. It must certainly be confessed that, in so far as it has

been possible to institute a comparison between turning and gastrotomy in cases in which the child is outside of the uterus, the presumption is entirely in favour of the latter. The results of turning, and of removal through the rupture and the vulvo-uterine canal, are, according to Trask, as unfavourable to the mother as when we abandon the case absolutely to nature. But in those in which the operation of gastrotomy has been preferred, the results have been much more favourable, about two thirds of the cases collated by Trask having been saved. We must be very cautious, however, in admitting such figures as representing the true facts of the case, as we cannot but believe that many fatal cases are, for reasons which are sufficiently obvious, suppressed. This is the reason why here, as well as elsewhere in this work, comparative tabular statements are omitted as likely to lead to misapprehension and false hopes. The safety of the child is, in all such cases, a secondary matter, but it may be admitted, as an element of the case for our consideration, that, where the operation of gastrotomy has been promptly performed, the child has occasionally been saved. On the whole evidence, then, we must pronounce in favour of gastrotomy when the child is in the peritoneal cavity, of turning when it has remained in the cavity of the uterus, and of the forceps or perforation where the head can be easily reached within the pelvis.

The operation of Gastrotomy is simply the first stage of what will afterwards be more particularly described as the Cæsarian Section.[1] A longitudinal incision having been made in the middle line, below the umbilicus, with those antiseptic precautions which the modern operation of Ovariotomy has made familiar to us, the child is to be at once removed, along with the placenta and such clots as may be within reach. The wound should then be closed in the usual way, and a full opiate administered, while the patient is ordered to be kept in a state of perfect quiet, both of body and mind. Some difficulty may possibly arise, both before and after the operation, as to the use of stimulants. The condition of shock and general depression, and the state of the pulse may, on the one hand, indicate that we should not withhold them; but, on the other, our apprehension of the dreaded though inevitable peritonitis is such, that we shrink from any treatment which might tend to aggravate the inflammatory action, upon the degree and extent of which the life of the patient will depend, more, perhaps, than upon anything else. It is, in fact, impossible, in this particular, to lay down rules for our guidance, so that we must act to the best of our

[1] When the incision is made in the flank, the operation is called Laparotomy. This term, however, is often loosely but erroneously employed as synonymous with Gastrotomy.

judgment, as the exigencies and peculiarities of an individual case may seem to indicate; but it will probably be necessary, in most cases, to rally the patient in some degree from the shock which has attended the accident, before proceeding to perform the operation which we may have selected.

In those cases in which rupture has occurred in the course of pregnancy, the treatment will, in some measure, depend upon the stage of pregnancy. In so far as rupture in the early months is concerned, something must be allowed for the difficulty of diagnosis, as it would be difficult, in such a case, to know whether it was a rupture of the uterus, or of the cyst of an extra uterine pregnancy. This distinction is not, however, one of any great practical importance, as the circumstances in the two cases may be looked upon as identical, the sole question for determination being whether we should risk the operation, or rely upon the chance of a cure by nature, either by discharge of the parts of the fœtus by ulceration, perforation, or by the formation of a lithopædion. When the rupture takes place in the later months of pregnancy, the conditions are quite different, and the indications of treatment are more those of rupture during labour. If we are certain that the fœtus has escaped from the uterus, there must be no hesitation as to the advisability of gastrotomy. For, with an os firmly closed, it would be futile to attempt dilatation of it and the cervix as preliminary to thrusting the hand through the uterus into the abdominal cavity, so that we cannot here even think of turning. Some have recommended, when the child is still within the uterus, a forced dilatation of the os, and even incision of the cervix, to be followed by turning; but we very much question whether, even in such a case, it would not be preferable to perform gastrotomy, and extract the child from the womb by enlarging the laceration, should this be necessary.

CHAPTER XXVII.

DEFORMITIES OF THE PELVIS.

Classification of Deformities.—Causes: Diseases affecting the Pelvis: Rachitis: Malacosteon.—Nature of the Brim Deformity characteristic of each.—Flat Pelvis.—Naegele's Pelvis.—Robert's Pelvis.—Deformities of the Cavity: Flattening of the Sacrum: Funnel-shaped Pelvis.—Distortion of the Outlet.—Relation of Pelvic Distortion to Spinal Curvature.—Masculine Type of Pelvis.—Infantile Type.—Effect of Muscular Action in Producing Pelvic Distortion.—Spondylolysthesis.—Pelvis Æquabiliter-justo-Major, and justo-Minor.—Obstruction from Exostosis, Osteo-Sarcoma, and other Tumours: from Fractures of the Pelvis, and Morbus Coxarius.—Symptoms: Measurements of the Pelvis: Pelvimeters: Examination by the Fingers.—Effects of Distortion.—Difference between "Impaction" and "Arrest."—Treatment: Prevention: Circumstances which call for the Forceps, Turning, or Craniotomy: Use of Forceps in Deformed Pelvis: Abdominal Section.

BEFORE passing to the more particular consideration of Operative Midwifery, it is proper that we should in the first instance turn our attention to the important subject of Pelvic Deformity, upon which condition a very large proportion of all midwifery operations depends. The first point which may be regarded as essential to the mastery of this important subject is, beyond all doubt, a correct appreciation of the normal standard, or, in other words, an accurate knowledge of the anatomy of the female pelvis, when of average dimensions and healthy in structure. Upon this also, as we have already seen, hangs the whole theory of the mechanism of parturition; but, so soon as deformity of any kind disturbs the relations which subsist between the various pelvic diameters, it converts the harmonious whole of a normal pelvis into discordant elements, to which it is impossible to adapt such laws as under ordinary circumstances guide our action. If the art of obstetrics stopped short here, it would have little claim indeed to the dignity of a science. No point, however,

within the area of our subject has attracted more of the attention of those to whose genius and industry we are under the deepest obligation; and the light which their experience and investigation has thrown on it, enables us in these days to look upon the deviations from the normal standard to which we have alluded with more of confidence than apprehension. For the occurrence of difficulties more or less formidable, then, we must be prepared, and nothing will suffice, for an intelligent and satisfactory appreciation of them, short of an intimate knowledge of the causes upon which pelvic deformities depend and the practical contingencies which they involve. Many attempts have, from time to time, been made to classify and reduce these morbid conditions into genera and species, but they have been attended for the most part, in so far as practical results are concerned, with but indifferent success. Many of the best authorities, whom we shall in this matter attempt to follow, abandoning any such scheme, have therefore attached to the conventional phrase, "pelvic deformity," a signification somewhat beyond what its etymology would seem to imply, so as to include, as we shall see, certain cases in which no deformity in the strict sense of the term exists, and yet in which the mechanical requirements of natural labour cannot possibly be assumed to exist. Many of the familiar terms arising from the systems of classification alluded to will be employed in the sequel, but only so far as may be necessary to meet the exigencies of formal description.

Causes.—The causes of pelvic distortion are various, but by far the most important are Rachitis and Malacosteon. Although closely allied in respect of the morbid conditions upon which they depend, these affections are, nevertheless, to be carefully distinguished in regard to the difficulties which they engender, and the effects which they produce on the course of parturition otherwise natural. An elaborate consideration of the pathological conditions, symptoms, and progress of such diseases is altogether foreign to a work such as this; but there are certain points of similarity, and still more of contrast between the two, a knowledge of which is essential to a correct appreciation of the subject in all its bearings, and to which, therefore, it is necessary that we should at this place briefly advert. One of the most essential, and, in regard to our subject, one of the most important points of distinction between rachitis and malacosteon is, that while the former is a disease of childhood, the latter is a disease of adult life; and it is only necessary to compare the form and degree of inclination of the pelvis of an infant (see Fig. 17) with that of the adult, to see that the effect which must inevitably be produced in the two cases, by a yielding of the osseous structures, can only be attended with results, as regards the

measurements and form of the pelvis, which of themselves would suffice to establish a marked distinction.

Rickets.—Rachitis or Rickets is, as we have said, a disease of infancy and childhood, which rarely manifests itself at a later period than the fourth year, and which is frequently supposed to be associated with a syphilitic taint. It is attended from the first by a marked cachexia, which the best authorities seem to regard as closely allied to that of scrofula; but the first symptom which clearly points to the nature of the case is the yielding of the bones, which soon gives rise to more or less of deformity in those parts of the skeleton which have most to do with the support of the body—namely, the spine, pelvis, and lower limbs. The chief morbid alteration upon which these phenomena depend is a diminution of the earthy constituents of the bones; but the change goes much further than this, and involves corresponding alterations in the animal portion, and thinning of the dense or laminated texture, with a consequent predominance of the cancellated structure, and the formation of certain new and semi-solid products. Some bones suffer more than others, and even some parts of the same bone may be affected to a comparatively greater extent. The amount of deformity which is thus produced will obviously depend, in a great measure, upon the extent to which the disease exists, and the continuance of the morbid conditions referred to; but it is generally observed that the deformity is not confined to any particular part of the osseous framework, but affects it generally, the more conspicuous symptoms being spinal curvature and flexion of the bones of the leg. With the distortion in these regions, or in the thoracic cavity, we have here nothing particular to do; but, as regards the pelvis, there is almost always more or less deformity caused by the weight of the trunk, which is thrown upon the bones of the pelvis from the spinal column through the sacrum. Another important point of special interest to us is that rachitis is usually accompanied with arrest of growth, which, although most marked in the lower limbs, and thus imparting dwarfishness to the frame, is also to be noticed in the pelvis, which is often, on this account, abnormal in respect of size as well as of distortion. We shall not further follow the symptoms and progress of rickets. It will suffice to observe that the general tendency is towards recovery, which is first indicated by an amendment of the general health, disappearance of the cachectic symptoms, and (with more inclination for muscular action) a steady amelioration in the morbid condition of the bones, in which the phosphatic deficiency is gradually improved. Ultimately, the health and strength are permanently restored, but the period of restoration merely fixes the bones for life in the distorted position.

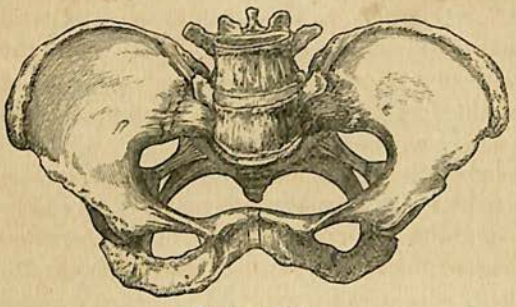
Judicious treatment during the period of convalescence no doubt often modifies the amount of ultimate deformity; but such treatment is usually directed to the spine and lower limbs, while the pelvis comes in for a much smaller share of attention. The accoucheur should always remember that the existence of spinal curvature is not in itself evidence of antecedent rickets, a consideration which may be of importance, chiefly with reference to prognosis.

Malacosteon.—This affection, otherwise called Osteomalacia, is much rarer than the preceding, is essentially a disease of adult life, and has been observed to be specially associated with pregnancy and insanity. The process of ossification has, we may suppose, been satisfactorily accomplished, and then come on, for the first time, the morbid conditions upon which the distortion depends. Although in this case, as in that of rickets, the most usual occurrence is a disproportion between the earthy and animal constituents of the bones, their whole structure suffers considerable alteration. It is more frequently observed in females than in males, while in rickets there does not seem to be any preference for sex. The general symptoms which accompany malacosteon are, from an early period of the case, very grave. It generally runs a rapid course, manifests no tendency to repair, defies all attempts at treatment, and has usually a fatal result. The disease may affect the whole skeleton, or may be limited to several bones, or to one, and it would appear that the pelvis at least rarely escapes. It would also seem to involve the entire texture of the affected bones more equably than rickets. Softening of the bones is the usual characteristic, but it may occasionally be attended with brittleness, to which the term Fragilitas Ossium has been applied. Mollities Ossium is not therefore to be accepted as absolutely synonymous with Malacosteon.

In contrasting these two morbid conditions, the first point of importance to the accoucheur is that, in rickets, we are dealing, not with disease, but with the effects of disease, the pelvis being, in fact, often more dense in structure than if it never had occurred, while, in malacosteon, we have actually existing and progressive disease. From this arises a practical point, which may be noticed here, although with no intention to exaggerate its importance. This is the possibility of some yielding of the bones of the diseased pelvis in the latter affection, so as to admit of parturition, or of operative assistance which would otherwise be unavailable. A case of this kind is given by Osiander, who, being about to perform the Cæsarian section in a malacosteon pelvis, made a final attempt by the hand—an attempt which, owing to such relaxation as is here described, actually succeeded.

The condition and circumstances of the patient, when attacked by one or other of these diseases, are such as to exercise a very important influence on the nature of the distortion. Rickets, in most cases, comes on before the child has begun to walk, or, if it has walked, the nature of the disease renders this no longer possible, so that the most likely mechanism of distortion in these instances is a force acting through the spinal column downwards upon a yielding pelvis. In malacosteon, on the other hand, the patient may walk or stand during the process of softening, and the weight of the whole trunk is thus transmitted to the heads of the thigh bones. This difference in the nature of the forces or mechanism of pelvic deformity is well shown in the characteristic features of rachitic and malacosteon pelves.

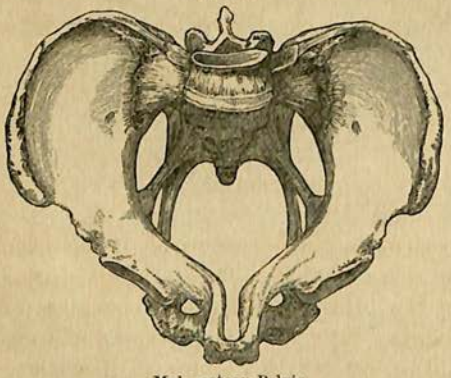
Fig. 151.



Rachitic Pelvis.

Elliptical Distortion: Flattened Pelvis.—In a typical case of the former variety there is, as shown in Fig. 151, a marked projection forwards of the sacrum by the operation of the cause above alluded to. This is by far the most frequent of all the varieties of deformity which have been described. It may or may not be associated with flattening of the anterior wall, and even with projection backwards of the symphysis pubis, but the effect, in every case, is a more or less marked diminution of the conjugate diameter of the brim. Different varieties of this distortion have been described as "masculine," "heart-shaped," and "figure of eight" deformities of the brim; all of which are, as will be observed, mere modifications of the same condition, and all of which partake of the character of *elliptical* distortion. The different varieties of what

Fig. 152.



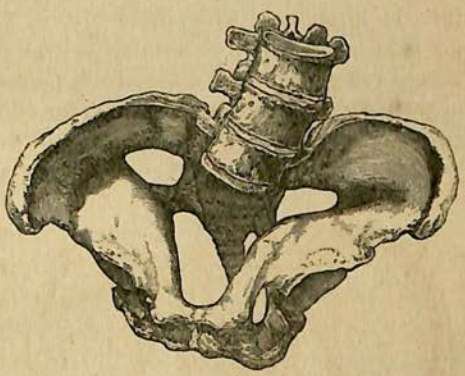
Malacosteon Pelvis.

has been described as "flat pelvis" fall, for the most part, under this classification. A flat pelvis may co-exist with either an increased, normal, or diminished transverse diameter. The first of these constitute the "simple flat pelvis," and in connection with it an important practical fact is to be noted, viz., that simple antero-posterior flattening involves compensatory lateral expansion.

Angular Distortion.—In malacosteon again, the general characteristic of the deformity is *angular*, and is due to antero-lateral displacement of the pelvic walls by pressure exercised upon the acetabula. This is indicated in a typical form by the rostrated variety shown in Fig. 152, where the conjugate diameter is increased at the expense of the transverse and oblique.

Endless varieties and combinations of these two may occur, so that the distinction between a rickety and a malacosteon pelvis is only to be accepted with the qualification that some cases partake of the characteristics of each. Thus, in the case of Isabel Redman, operated upon by Dr. Hall, the conjugate and oblique diameters were both involved, constituting a very serious modification of distortion in this situation. These are, of course, mere illustrations of possible variations, which might be infinitely multiplied; but it is to be remembered that a considerable number of cases have been met with, in which an undoubtedly rickety pelvis presented all the more prominent characteristics of malacosteon deformity.

Fig. 153.



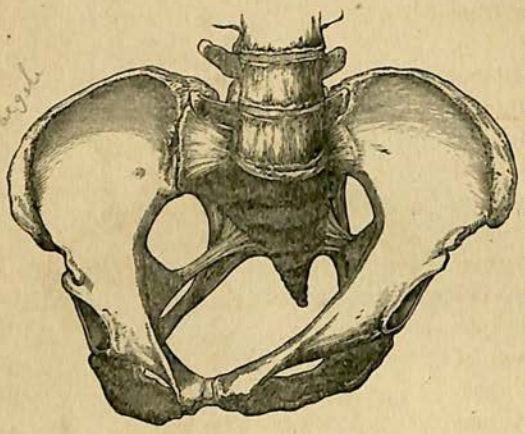
Isabel Redman's Case.

In so far as the true malacosteon pelvis is concerned, it has been well observed by Stanley that there is no diminution in the actual circumferential measurement of the brim; and that the bones are of their natural bulk and proportion, so that, "if their various doublings were unfolded," the pelvis would be restored to its normal dimensions and form. In rickets, however, this does not usually apply, owing, as has already been observed, to the partial arrest of development which obtains during the course of the disease.

Naegele's Pelvis.—In the majority of cases of pelvic deformity, there is a want of symmetry, one side being affected to a greater extent

than the other. This is due to a variety of causes, probably one of the most important being the alteration of the centre of gravity in consequence of spinal curvature. A very peculiar and extreme variety of this kind is that which was so fully described by Naegele in his memoir on the subject as the "*pelvis obliquè-ovata*" or Obliquely Distorted Pelvis.

Fig. 154.

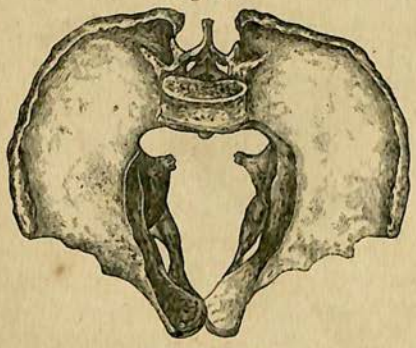


Obliquely Distorted Pelvis.

In these very interesting cases, there is anchylosis of the sacro-iliac articulation on the affected side, which is flattened and its development arrested, as is shown in Fig. 154. Half of the sacrum is imperfectly developed, and the oblique distortion is such that the whole of that bone is carried towards the affected side, while the sacro-iliac synchondrosis of the sound side is brought nearly opposite to the pubic symphysis.

Deformities of the Cavity.—Deformities of the cavity of the pelvis may either be associated with some of those above described, or may exist independently. One of the best known of these, and which is by no means an uncommon cause of impaction of the head within the cavity, is "flattening" of the sacrum as is shown in Fig. 156. The normal recession of that bone being awanting, the conjugate diameter of the cavity is proportionally curtailed, and the movement of rotation rendered impossible.

Fig. 155.



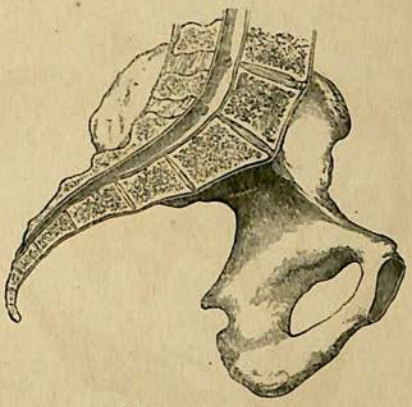
Robert's Pelvis.

Robert's Pelvis.—A still rarer form of deformity is what was originally described by M. Robert, in which both sacro-iliac synchondroses are anchylosed. The sacrum is described as very narrow, and only slightly wider at its upper than at its lower extremity, so that the transverse measurement is contracted in a very remarkable degree.

The iliac fossæ are flattened and directed forwards. The iliac spines and tuberosities are in close proximity, so that the sub-pubic angle is extremely acute, the average diameter of the outlet being less than ten inches. The form of the brim is that of a long and narrow wedge with its apex directed anteriorly, and the cavity is of unusual depth.

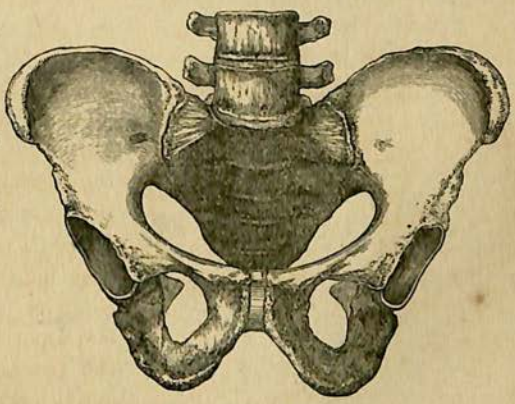
In other cases, the diameters of the pelvis are diminished from above downwards, so as to constitute what has been designated and described as the "funnel-shaped" pelvis. An example of this, from an original drawing of such a case, is shown in Fig. 157, in which the gradual approximation of the ischial planes is greatly increased, and the flattening of the sacrum contributes to the reduction of the conjugate diameter.[1] Sometimes the curve of the sacrum is too great or too abrupt, as in the case represented in Fig. 158. This, however, might perhaps be supposed to come more within the category of distortion of the outlet, although it may, we apprehend, be fairly considered as contributing to both.

Fig. 156.



Flattening of the Sacrum.

Fig. 157.



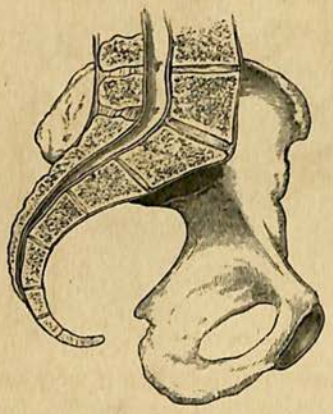
Funnel-shaped Pelvis.

Deformities of the Outlet.—Distortion of the outlet is necessarily involved in many of the varieties which have been described. The general effects produced in malacosteon are, then, a narrowing of the transverse diameter, chiefly by approximation of the acetabula. This implies, as a reference to Fig. 152 will more clearly show, a diminution of the corresponding diameters of the cavity

[1] Another but rarer variety, described by Spiegelberg, is when the funnel is, as it were, inverted, and a contracted brim is combined with a gaping outlet.

and outlet, which brings the tuberosities of the ischia nearer to each other, and thus reduces the sub-pubic angle, so that the head must descend further in the direction of the perineum, before it can pass under the sub-pubic arch. And, in like manner, a diminution of the conjugate diameter at the outlet will materially impede the birth of the head. An abrupt curve of the sacrum, as shown in Fig. 158, will have this effect, and if there should be, as has been observed, anchylosis of the sacro-coccygeal articulation, the difficulties of the case will thereby be materially increased. When the deformity is confined to this part of the pelvis, it has been observed that approximation of the ischial tuberosities is quite as frequent as conjugate contraction.[1]

Fig. 158.



Exaggerated Sacral Curvature.

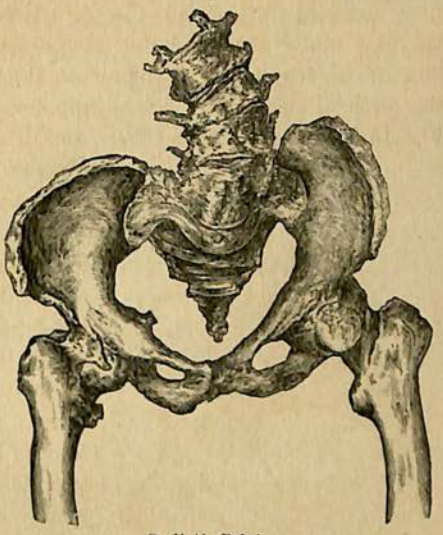
The masculine type of pelvis has already been mentioned in reference to the deformities which exist at the brim. An extension of this to the cavity and outlet constitutes a very serious impediment to labour. In such cases, we may have the bones of the pelvis thicker, heavier, and more marked with muscular attachments, the cavity deeper—as is more particularly shown by the greater depth of the pubic symphysis—and the sub-pubic angle rendered more acute by an approximation of the ischial tuberosities; in fact, a state of matters closely resembling what has already been described as the funnel-shaped variety. Or, again, we may have an infantile type of pelvis, in which, from arrest of development, with or without rickets in other parts, the inclination of the brim is greater, and the transverse diameter relatively less than is normal, while the whole pelvis is smaller than it should be.

Effects of Spinal Curvature.—A very intimate and interesting relation has been shown to exist between the different varieties of spinal curvature and those of pelvic distortion. In each variety of curvature, anterior, lateral, or posterior, the centre of gravity of the trunk is necessarily disturbed, and the inevitable compensatory movements give rise not only to the characteristic adaptations of the spinal column, but also, by a corresponding action upon the softened rachitic

[1] For an exhaustive account of the difference between malacosteon and rickety pelves, embodying the researches of Meyer of Zurich, see an article by Dr. Matthews Duncan in the Edinburgh Medical Journal for April, 1856.

pelvis, determine in a great measure the nature and the degree of the deformity. Anterior curvature (*Lordosis*) tends mainly to contract the conjugate diameter of the brim by forcing forwards the promontory of the sacrum, while at the same time there is a tendency to a tilting backwards of the apex of the sacrum as far as the sacro-sciatic ligaments will permit. Lateral curvature again (*Scoliosis*) gives rise to a quite different kind of compensating deformity. The promontory is in this case pressed towards the side of incurvation, and thus brought nearer to the corresponding ilio-pectineal eminence, so that in every such case the distortion is more or less oblique or non-symmetrical, as shown in Fig. 159.

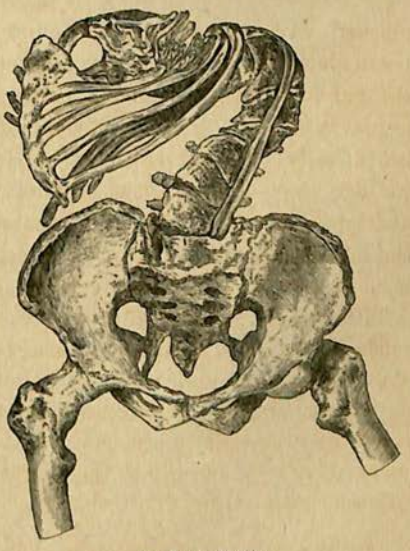
Fig. 159.



Scoliotic Pelvis.

But, perhaps, the most interesting variety of all is that which is the result of posterior curvature (*Kyphosis*). The conditions here are exactly the opposite of what we notice in lordosis, inasmuch as the compensating forward curve of the spinal column tends to throw the promontory of the sacrum backwards, and thus increase the conjugate of the brim. By this the coccyx is tilted forwards, and it has been observed further that there is a tendency in the early stage of rickets to a simultaneous contraction of the transverse diameter of the outlet. The usual conditions which are thus involved in what we call a kyphotic pelvis, have a general

Fig. 160.



Kyphotic Pelvis.

resemblance to the ordinary funnel-shaped variety, although the conjugate of the brim is much more increased in the former. The term "kyphotic pelvis" seems, indeed, to be somewhat loosely employed by some writers as synonymous with "funnel-shaped." This, however, is a manifest inaccuracy, as the true funnel pelvis has no relation whatever to spinal curvature in any of its forms.

Effect of Muscular Action.—It is a fact familiar to every surgeon, that the action of the muscles plays a most important part in producing distortion of a rickety skeleton; but it would appear that this cause of pelvic deformity has not received anything like general attention at the hands of obstetric writers. The following observations on this point are borrowed from Dr. Murphy:—"In the motions of the body, there are two sets of muscles connected with the pelvis to be considered, each having a distinct office to perform. One set, passing anteriorly and posteriorly, between the pelvis and the thigh bones, keeps the pelvis fixed to its position; these, therefore, would act very powerfully in distorting the softened bone to which they are attached, but would manifestly produce a much greater effect when the body is upright and the pelvis is made a centre of motion, as in the adult pelvis, than when the body is bent forwards, and moves less upon the pelvis, as in the child. Such we find to be the case: the lower portion of the sacrum and the coccyx is bent, nearly at a right angle, by the great gluteal and pyramidal muscles, and close up the outlet. Anteriorly, the effect is not so apparent in the adult pelvis, because it is counteracted by the acetabula and ischio-pubic rami being pressed in towards the centre; but still the edges of these rami are more everted, and the pubic arch itself, immediately beneath the symphysis, is wider than it ought to be. The other set of muscles are those that maintain the body in its erect position; posteriorly, the dorsal; and, anteriorly, the abdominal muscles. The tendency of the former is to draw the sacrum towards the spine, and thus to increase the projection of the promontory; the effect of the latter is to draw the ilium more upright, and to render it more irregular. The action of these muscles will therefore explain the character of some of the distortions in the adult pelvis. In the infant pelvis, their influence is modified by the altered position of the body. In this case, the weight from above presses down upon the thigh-bones, and tends to separate them more from each other; the muscles, therefore, passing between them and the pelvis, will draw outwards that portion of the pelvis to which they are attached; hence the ischio-pubic rami are more separated, and the tubera of the ischia more apart than natural; but the distance of the thigh-bones being increased, the coccyx can still be drawn forwards by the muscles attached to it; consequently

the outlet is much more open than it ought to be, and the abruptly-curved sacrum becomes the only impediment to the escape of the head."

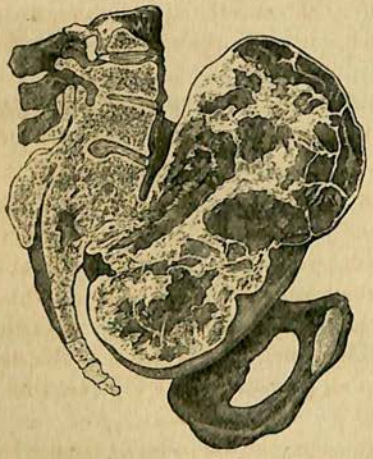
Other Varieties.—It will be understood that the varieties of pelvic deformity above described are far from embracing all that might be adduced, as our object has been to avoid complication by simplifying the subject, as far as is consistent with a correct appreciation of the facts which may be supposed to bear upon practice. Some of the rarer deformities are figured in Moreau's atlas. There are still, however, one or two conditions which, although not strictly pelvic deformities, are very properly considered along with them. Among these, we may first mention deformity due to disease of the lower portion of the spinal column, in which curvature, or other displacement of the bones, may prove as effectual a bar to natural delivery as the more common varieties of deformity at the brim. Of this nature is the affection which has been described under the name of *Spondylolysthesis* when the last lumbar vertebra slips downwards and forwards, and directly encroaches on the conjugate of the brim, in such a manner as to form an impediment which may be of character even more serious than the ordinary rachitic projection of the promontory.

Nor can we omit to mention two other varieties of peculiarity in conformation, in each of which the shape of the pelvis, and the relative measurements of its parts, are perfectly normal. The former of these, which has been termed the *Pelvis æquabiliter-justo-major*, implies a pelvis which is symmetrically increased in all its diameters. Although such a conformation as this must necessarily act by facilitating labour, by the comparative ease with which it admits of the passage of the child, it is not to be regarded as a favourable condition. On the contrary, precipitate labour is always, and with good reason, looked upon with apprehension, as experience teaches us that, when moderate and normal resistance on the part of the pelvic walls is awanting, violent and rapid dilatation of the soft textures of the canal necessarily takes place, to the danger of their integrity at any part from the os uteri to the vulva; and there are, in addition to this, other dangers, which will afterwards be more particularly described. The only advantage which may accrue from such a pelvis occurs, according to Churchill, in face presentations. To this we may perhaps add occipito-posterior positions of the cranium, and, in the absence of all assistance, transverse presentations, as it would naturally favour spontaneous expulsion or evolution. The *Pelvis æquabiliter-justo-minor*—the other variety referred to—is the converse of this. We have here also a perfectly-shaped pelvis; but all the diameters are less than usual, so that a special impediment must in every such case

exist, in a degree proportionate to the extent of the symmetrical deformity. What makes this a condition more unfavourable than we might at first suppose, is the absence of any possible compensation in one direction for a deformity existing in another. We thus find that the moulding process is of much less avail here than where, for example, we have a moderate degree of conjugate contraction, with an ample measurement in the transverse, in which latter direction the head may, by compression, elongate itself, and thus, by changing its shape, pass the obstacle, after a certain amount of delay.

We may here consider the effect which is produced by certain surgical diseases or accidents, which may prove impediments, more or less insuperable, to normal parturition. These are in their nature various, and, in their extent, offer every variety, from a slight encroachment upon a single diameter to complete blocking up of the true pelvis. *Osteosarcoma* and *Exostosis* are two of the most important of these affections, and may constitute, if of any size, an impediment which renders delivery by the natural channel quite impossible. These tumours may take their origin from any part of the osseous tissue of the pelvis; but the situation from which they most frequently spring is the upper third of the sacrum, encroaching therefore upon the brim and cavity by spreading from this centre. Care must be taken, by examination through the vagina, and, if necessary, through the rectum, not to mistake these for abnormal contraction of the brim, due to projection of the sacral promontory. This is an error which has been committed, and which would probably be in most cases avoided by external measurement of the pelvis; and, if it should, in the course of such an examination, be discovered that the measurements in question were normal in extent, the presumption of exostosis would be increased. The absolute hopelessness, in the case of an exostosis of large size, of delivering by the vagina, will appear by a reference to this familiar figure.

Fig. 161.



Pelvic Exostosis.

Cancerous disease of the pelvic bones, resulting in the development of tumours of greater or less consistency, may constitute a serious mechanical barrier, besides being a condition which, apart from this,

involves the life of the mother. These tumours may spring from any part of the pelvis, and will probably develop in the direction in which there is least resistance, so that, if they have their origin in its inner surface, they can scarcely fail seriously to reduce the diameters of the pelvis, in the same manner as the benign tumours previously described.

The projection from certain portions of the pelvis of *Osseous Spicula* was made the subject of very painstaking investigation by Kilian, who found that a common situation of such spicula is at the margins of the various symphyses. It is not difficult to foresee the effect of such sharp thorn-like projections if they should chance to spring from the sacro-iliac synchondrosis, or from any other part of the brim of the pelvis; and, indeed, in such cases—which are fortunately very rare—scarcely anything could be looked for but laceration of the uterus and possible rupture. It would appear to be a general belief, that bony growths from the pelvis are in some way associated with the gouty or rheumatic diathesis. Partial ossification of the sacro-sciatic ligaments has been sometimes observed, and, when this takes place, the peculiarity would, no doubt, be suggestive of the natural condition in some of the lower animals. From these, from the other ligamentous structures, and from the periosteum, tumours of the fibrous or fibro-sarcomatous variety may spring, which, when constituting an apparent deformity in the pelvis, have sometimes been successfully removed in the course of labour. Any attempt at the removal of the purely bony tumours is out of the question, but cases have occurred in which the texture of these tumours was so loose, and so entirely composed of weak cancellated structure, as to admit of being crushed or broken down, either by the fœtal head or the manipulations of the accoucheur.

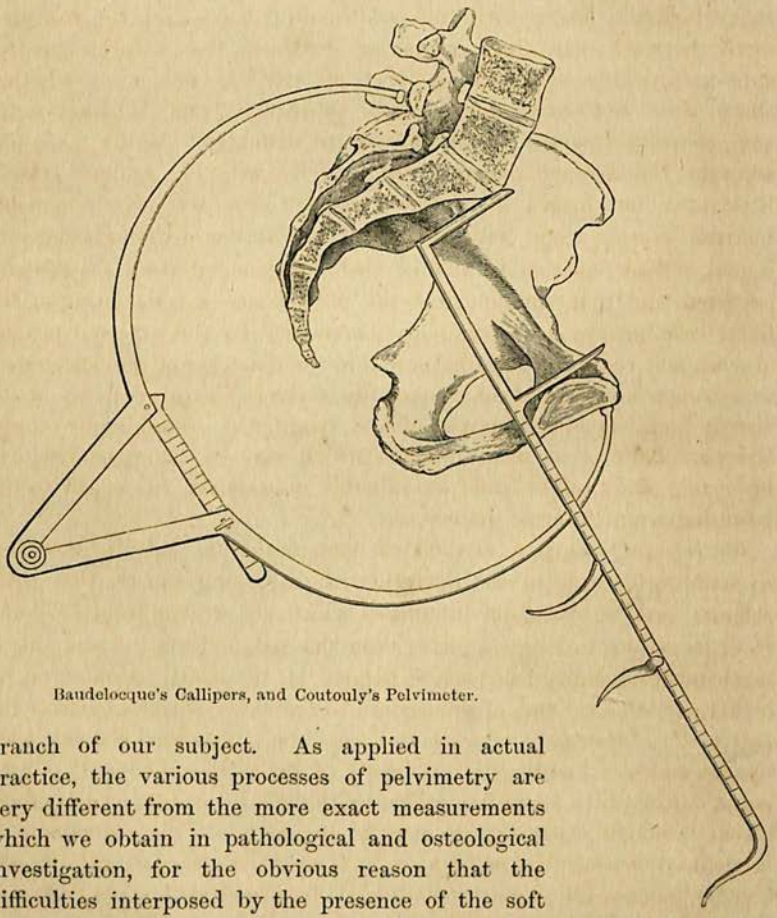
Fractures of the pelvis are occasional causes of a pelvic deformity, either from the union of the fractured bones in a distorted position, or from the irregular development of callus in the direction of the pelvic cavity, the diameters being thereby reduced. Projections of this kind have been observed, in which the pelvic diameters involved were reduced to the extent of one and even two inches. Very considerable deformity of the pelvis may also be the result of *Morbus Coxarius* which has gone on to dislocation and anchylosis, or of fracture or dislocation of the head of the bone--the effect being due, in such cases, to the distorted condition of the limb acting, in all probability, on a pelvis which is morbidly softened.

Symptoms.—These may, to a great extent, be inferred from what has been said in reference to the causes from which pelvic deformities are believed to arise. In marked cases, involving considerable deformity—such as may be due to Rachitis—the general distortion of the

skeleton will point to the pelvis as a part of the solid framework of the body which can hardly be expected to have escaped. But an obvious rickety condition of the skeleton is no evidence whatever, either of the degree or of the nature of the deformity. It is necessary, therefore, in such instances, if we desire to gain an accurate knowledge of the nature of the case, to observe with great care the actual pelvic measurements.

Pelvimetry.—The methods which have been suggested for the measurement of the pelvic diameters constitute an important practical

Fig. 162.



Baudelocque's Callipers, and Coutouly's Pelvimeter.

branch of our subject. As applied in actual practice, the various processes of pelvimetry are very different from the more exact measurements which we obtain in pathological and osteological investigation, for the obvious reason that the difficulties interposed by the presence of the soft tissues are of such a character as, in many instances, absolutely to invalidate such conclusions as, on a cursory examination, might at first seem to be indicated. This will become more obvious by an examina-

tion of the various methods in detail, in the course of which we shall find it convenient to divide the processes employed into those of External and Internal Pelvimetry.

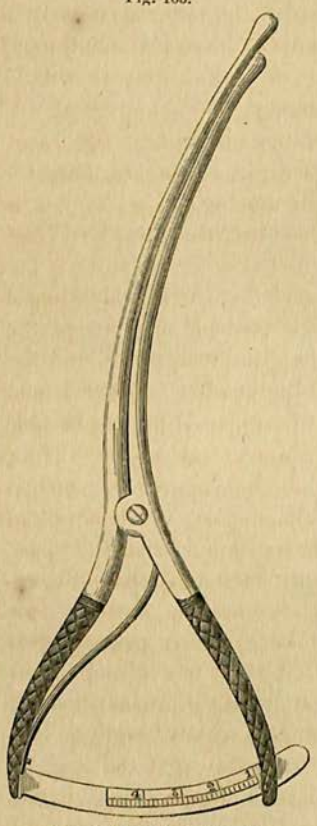
(*a*) *External.*—The conjugate diameter is that which in most instances we are anxious to determine, and, in so far as this may be inferred from measurement in the living subject, it may be approximately ascertained by the use of Baudelocque's callipers, which are here shown. By this, and making a deduction of about three inches for the soft parts, the measurement from the posterior sacral spines to the anterior surface of the pubic symphysis should be about seven inches. Along with this, we should always take the measurement between the iliac crests, or between the anterior-superior spinous processes of the same bones, in order to determine whether there does not exist, along with conjugate brim contraction, a compensatory increase in the transverse diameter. If, for example, we take the average diameter between the superior spines to be a little over ten inches, and observe further that we have a sensible increase in this along with a marked diminution of the external conjugate, we are entitled to assume that such compensation has actually occurred, and that, consequently, the possibilities of a moulding of the fœtal cranium are correspondingly increased. By the external process also we may recognise any diminution in the diameter of the outlet such as an approximation of the tuberosities of the ischia, or of the tip of the coccyx and the lower margin of the symphysis. And, besides these, there are many other measurements which may be taken, and which, in certain cases, might yield us valuable information in regard to the more important internal diameters.

(*b*) *Internal.*—Such a method of examination as this is, however, so manifestly open to the operation of disturbing causes, that little reliance can be placed on inferences which are drawn from it alone, so that various instruments have been devised, and a great amount of mechanical ingenuity has been expended on the construction of an internal pelvimeter. One of the earliest instruments of this kind was the pelvimeter of Coutouly, which closely resembles in its form the rule used by shoemakers in measuring the length of the foot, and consists of two parts, one of which slides in a groove on the other. A limb projects from the extremity of each of these at right angles to it. The instrument is introduced beneath the pubic arch, and pushed onwards until the extremity touches the sacral promontory. It is held in this position, and the pubic portion is then slid forwards until it touches the posterior surface of the symphysis. The distance of the sacrum from the pubic bones is indicated by the extent to which the anterior portion is thus

drawn out, which is read off in inches marked on the stem. The total length of this instrument, which is also represented in Fig. 162, is about eleven inches.

An immense number of pelvimeters have since then been invented. That which is here figured, as designed by Dr. Lumley Earle, is probably one of the best and simplest: it is to be introduced into the vagina, with the shorter of the two limbs turned towards the pubes, and, on the extremity reaching the level of the brim, as ascertained by the finger along which it is carefully guided, the handles are pressed together, and their divergence read off on the scale which is between them. The objection to all such internal instruments is, that they are difficult of application so as to insure accurate results, and besides very unsafe, unless used with great caution. Coutouly's is, for reasons which are quite obvious, inapplicable to cases in which the woman is in labour, and, indeed, to cases of pregnancy, so that in the very instances in which we are most anxious for exact information, it is practically valueless. Dr. Earle's is, no doubt, from this point of view, to be preferred. But even when, in the absence of pregnancy, we may wish to ascertain the condition of the pelvis, it is by no means an easy matter to use either the one or the other.

Fig. 163.



Lumley Earle's Pelvimeter.

All such contrivances, indeed, as have hitherto been invented are open to the objections which have just been stated. Many of the best authorities have, on this account, absolutely discarded them, and prefer the simpler method of investigation by the finger. The various methods by means of which we may thus gain information have been admirably described and illustrated by Dr. Ramsbotham. "Three methods," he says, "are practised: one is, by the introduction of the first finger of the right hand within the vagina, so that the point should be carried up to, and touch the sacral promontory, while the root of the finger is

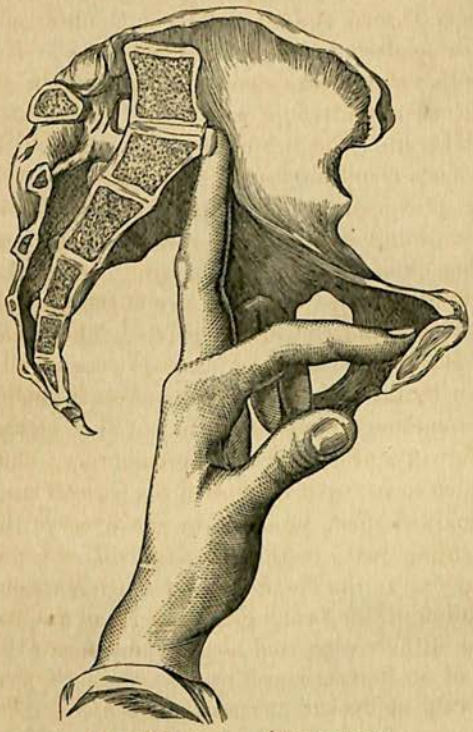
applied exactly under the symphysis pubis, at the upper part of the arch. It must be evident that this mode of inquiry will be of no avail unless the pelvis be greatly distorted—considerably under three inches, indeed, in the conjugate diameter. For the ordinary length of the index finger along its inner edge is less than three inches; and as the oblique line from the promontory to the apex of the pubic arch exceeds the direct line across, so if there be more than the space just mentioned, the finger would not be able to reach the projection, and we should consequently be in utter ignorance what amount of room existed. If the pelvis be very small, the sacral promontory can be felt with ease; but, even in that case, the dimension of the direct conjugate diameter is not afforded, but the length of the oblique line is given; and it is not always possible to calculate the difference between these two lines accurately.

"Another mode which has been recommended is the introduction of the whole left hand within the pelvis, with the outside or point of the little finger touching the inner surface of the symphysis pubis, and the first finger placed against the promontory of the sacrum. As every man is aware what his hand measures across, it is supposed he will be able to ascertain the transverse (conjugate?) diameter of the pelvis. Thus, presuming the hand to be two inches and three quarters wide, which is the common average about the centre of the fingers, if when placed edge-ways, it just fits the brim, the examiner will know that the space is within three inches. Again, if he can only introduce three fingers instead of four, he will know that the pelvis does not measure two inches, and probably not so much; and, if he can only pass up two fingers, closed together, he will be assured that there is not more than an inch and three eighths. But, on the contrary, if, in introducing the whole hand, he be compelled to spread his fingers widely before he can touch the sacral promontory, he will then be certain that the space is more than three inches, probably four, or near it. But it is not always easy to follow this mode of inquiry, because the child's head is generally protruded somewhat into the pelvis, even when the brim is contracted; and we could not carry the hand up in this manner, and make the accurate examination which we require to do, unless the brim as well as the cavity were perfectly free and unoccupied. It might, perhaps, be employed with advantage, provided the deformity was excessive.

"The third method I consider the best, and is the one I myself adopt. Two fingers of the left hand are to be carried within the vagina; the extremity of the first finger is to be placed exactly behind the symphysis pubis, and the tip of the second against the sacral promontory. (See

Fig. 164.) By stretching the fingers in this way, we shall have little difficulty in reaching the promontory of the sacrum, even when the pelvis is of ordinary dimensions; and by withdrawing them in the same position, we may measure off the distance between their extremities on the first finger of the right hand, or on a scale of inches, or with the limbs of a pair of compasses; and, consequently, we arrive at an accurate knowledge of the great dimensions of the pelvic brim. The laxity of the vagina and other soft structures, which almost invariably attends the process of labour, will permit the fingers to be withdrawn while extended; and if the examiner uses sufficient care, they may be kept perfectly steady until the space which they embrace be ascertained. This mode of proceeding possesses a great advantage over the other two, inasmuch as we are able equally well to make our examination, whether the head be occupying a part of the pelvic cavity, or whether it be still detained quite above the brim; for, even if it be engaged in the vagina, one finger may be passed anterior to, and the other behind it, with comparative ease."

Fig. 164.



Manual Pelvimetry. (Ramsbotham.)

It is only, however, after considerable experience that such arbitrary methods of examination are of much value in diagnosis. Very marked deformity is usually recognised easily enough, but the more important question of the degree or amount of distortion is not so readily solved, and will always require most careful and exact observation. It is upon the latter, indeed, that the most important practical considerations hinge; and upon the result of such an investigation, be it right or wrong, will depend whether, in a given case, we determine in favour of

operation by the forceps, turning, craniotomy, or abdominal section. The actual measurements which relate to these operations will be more particularly considered in the chapters which follow.

Effects of Pelvic Deformity.—The effects, during labour, of pelvic deformity, are often very serious, and are usually to be observed, as might be anticipated, in neglected or mismanaged cases. An occasional result of long-continued pressure upon the tissues of the os and cervix is sloughing of these parts, attended with irritative fever and general symptoms even more severe. The destruction of tissue which is involved in this process may result in fistulous openings into the bladder or rectum, requiring subsequent operative procedure for their cure. Pelvic deformity is, as is universally admitted, a frequent cause of rupture of the uterus, sometimes from actual bursting, due to the violence of the pains, and, in other cases, from pressure of the walls of the uterus against some part of the brim of the pelvis. The great amount of pressure which is exercised in these cases is occasionally shown in a significant manner by the moulding and alteration in shape of the child's head. This sometimes presents an indentation of the parietal bone from the pressure of a projecting sacral promontory; and, under the influence of the same cause, even fracture of the parietal bone has taken place. Another marked effect, produced by the arrest of the child's head or other presenting part, is the formation of a caput succedaneum of very unusual size, in the observation of which a serious error may arise. The formation of this swelling is a process of gradual development in the direction of the vagina, and not of sudden growth: it may therefore happen that an inexperienced person, who feels that the actual surface of the scalp approaches nearer and nearer to the finger, may take this as evidence of a gradual advance of the head, the passage of which may nevertheless be absolutely barred. If, in consequence of this or any similar error in judgment, the case is left too long to nature, the powers of the woman progressively decline, and she soon reaches a condition in which we act at a great disadvantage, and even with much apprehension as to the ultimate result.

In cases of extreme deformity, the head does not even engage in the brim, so that the effect of the ordinary expulsive efforts is simply to pinch or compress, against the pelvic walls, the attenuated portion of the uterus below the ring of Bandl in such a way as greatly to increase the danger of rupture. When the deformity is confined to the brim, and the promontory is not within reach of the finger, the nature of such a case is probably overlooked at first, as the examiner may conclude, from a simple exploration of the vagina by one finger, that everything is quite normal and that the presenting part will descend

presently. In other instances, the obstruction being less in degree, the vault of the cranium passes the plane of the brim, and the head is only arrested when its principal diameters come to be involved; and, in a third class of cases, the obstacle being in the cavity or even at the outlet, labour goes on quite naturally until the head reaches the particular plane at which the obstruction exists.

"Impaction" and "Arrest."—There is one point, in reference to these cases, in which it is of much importance that we should ascertain the relative condition of the parts involved: this is best expressed by drawing a careful distinction between the terms "impaction" and "arrest," which are sometimes used somewhat loosely, as if the expressions were synonymous. By impaction, we should imply only such a condition of the head as consists in its being actually jammed in the pelvis. In such a case, not only does the head make no advance with the pains, but it does not recede during the interval, so that it is immovable in both directions. In a case in which the head is only arrested, however, there may be an equal impossibility as regards the advance of the head; but its recession during the interval between the pains shows that the period of impaction has not yet been reached—a point which may be of very considerable importance in regard to the probable success or failure of a given operation.

Treatment.—The management of cases of pelvic deformity will be treated of in detail, when, in the subsequent chapters, the various operations are considered, the necessity for which arises in a great measure from this particular cause. The accoucheur is occasionally consulted in reference to such cases, at a time when the dangers of pelvic distortion may be averted or modified. If it be a question as to marriage, it may be a very difficult as well as a delicate matter to decide, in a rachitic patient, between celibacy and the possible dangers of pregnancy; but, if the case should be put before us, we must simply advise according to the facts revealed in the course of a thorough examination, when, if there should be evidence of such distortion as would probably call for the operation of craniotomy, it will be proper to withhold our sanction to a marriage under such circumstances. Another possible case, in which prevention rather than treatment may require consideration, is when the woman is pregnant, and the evidence of extreme distortion is clear, or when, in previous pregnancies, labour has only been terminated by the sacrifice of the child. In both of these instances, the question which arises is that of the induction of premature labour, by which alone, it may be, the safety of the mother can be insured. It is generally, however, in the course of labour at the full

time that the nature of the case is disclosed, and prompt and decisive treatment called for.

Having endeavoured to ascertain, approximately at least, the amount of distortion, we must, in the first instance, decide whether, and if so, to what extent, we should give nature a chance. In the minor degrees of pelvic deformity, it is always proper to do so, if the strength of the patient be not exhausted, and the uterine effort not unduly violent. When the cranium is of moderate size, it frequently occurs that, even in unpromising circumstances, the head becomes so moulded as to pass with perfect safety both to mother and child, although probably after a tedious labour. If the head is not actually impacted, we may have the choice of three operations—the forceps, turning, or craniotomy; but when impaction has taken place, it is impossible to pass the hand, and, therefore, turning is struck out of our calculations altogether. In every case in which the head is in the cavity or at the outlet, the forceps should be preferred, unless, indeed, there is clear evidence that the head cannot pass without a reduction of its bulk, when any attempt of this kind would be worse than useless. If, however, the head should be at the brim, the use of the long forceps involves other and more serious considerations, and is, indeed, regarded as an operation so dangerous that not a few of the most distinguished of modern obstetricians have expressed a decided preference for turning as against forceps, and even, under certain circumstances, for turning as compared with craniotomy when the head is in this particular situation. The general rules which are laid down for our guidance in the application of the forceps in ordinary cases are, to a limited extent only, of avail here. The altered conditions of a deformed pelvis, differing more or less in every case, put such rules as serve for the normal pelvis completely out of the question. Instead, for example, of applying the blades to the sides of the head, it is often necessary to apply them to the forehead and occiput, and, in general terms, it may be said that our duty is to apply them in the direction where we have most room, and where we can get the firmest grip of the cranium. Thus, if the head is arrested at the upper portion of the cavity, in consequence of projection of the sacral promontory, the sides of the head will probably be strongly compressed in the reduced conjugate diameter. The insertion of the blades of the forceps in such a direction would, therefore, be practically a matter of great difficulty, if not impossibility, so that the operator should at once, and without hesitation, apply the blades to the long diameter of the head in the transverse of the brim.

If the head is at the brim, and the distortion not excessive, we should in the first instance, make a gentle attempt by the long double curved

forceps, which should be of considerable strength in construction, in order to gain an efficient hold, and to prevent slipping. The operator, bearing in mind the immense power of such an instrument, will be excessively cautious in the amount of force which he employs, and will only persist if he observes some indication of yielding.

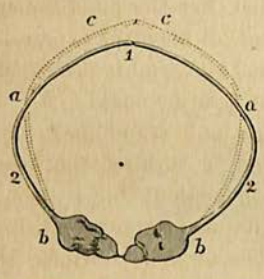
Putting, for the moment, out of the question what have been called long-forceps cases, there are few points of undoubted practical importance in reference to which greater difference of opinion obtains, than with regard to the proportion of cases in which we are justified in applying the forceps in the minor degrees of pelvic disproportion. When we find one practitioner of experience using it only once in a hundred labours, and of another, of equal experience, in every eighth or ninth case, it is by no means easy to decide who is in the right. For our part, we entertain a very confident belief that the practitioner who uses the forceps in less than five per cent. of all his cases exposes many of his patients to needless pain and increased risk, and is pretty sure, in his practice, to lose more children in labour than he ought.

When the decision lies between turning and craniotomy, we must first convince ourselves that, if we succeed in turning, the head can in all probability, be got through the contraction; for it sometimes happens that, after turning, delivery can only be accomplished by perforating behind the ear. It must, therefore, be obvious, that it would be better to perforate, and deliver at once, than to turn and then perforate, thereby subjecting the woman to a twofold danger. We must also be able to displace the presenting part without employing much force, so as to introduce the hand into the uterus; and it is certain that, when this cannot be done without violence, it is better at once to desist. One of the most important bearings of this interesting subject is whether the child is alive or not, which may be ascertained by the stethoscope in the usual way. If it is so, the possibility of saving the child—which has sometimes been done when the general condition seemed little to encourage the hope of such a favourable result—is the strongest possible inducement we can have for choosing turning, giving the child the chance at least, small though it may be, of which craniotomy deprives it.

Among the minor arguments which have been used in support of this procedure, may be mentioned the repugnance with which one naturally regards any operation which involves the mutilation of the child, and the use of instruments instead of the hand. And again, as has very clearly been pointed out by Simpson, there is an undoubted advantage in the manner in which "the transit of the cone-shaped head of the child, through a somewhat narrow brim, is facilitated by the

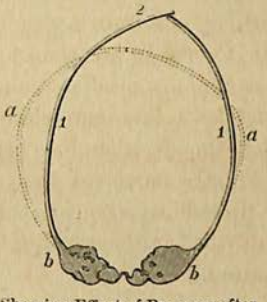
narrow end of the cone (or bi-mastoid diameter of the head) being made to enter and engage first in the contracted brim; and the hold which we obtain of the extracted body of the child enables us to employ so much extractive force upon the engaged fœtal head, as to make the elastic sides of the upper and broader portion of the cone (or bi-parietal diameter of the cranium) to become compressed, and if necessary indented, between the sides of the contracted brim." This will be more clearly understood by a reference to the diagrams by means of which he illustrates his theory. In both figures the dotted line indicates the normal condition of the fœtal head, which has not as yet been exposed to special pressure. In Fig. 165, the vault of the cranium

Fig. 165.



Showing Effect of Pressure in Cranial Presentation.

Fig. 166



Showing Effect of Pressure after Turning.

(*c c*) is supposed to present, and if the deformity is such as to prevent the head entering the brim, the effect of pressure is to increase its transverse measurement, while it assumes the form indicated by the outlines *b* 2 1. But if the child be turned, and the base of the skull brought down in advance (Fig. 166), the pressure exercised by the walls of the pelvis causes the head to assume the shape indicated by the outline *b* 1 2, with a very manifest mechanical advantage. But, in addition to this, the operation of turning, when it can be effected, even after some time and with some difficulty, is, there is good reason to believe, more safe to the life of the mother than that of craniotomy, so that, even when the child is dead, it is often to be preferred. But, when the child is dead, and turning is unusually difficult or impracticable, we must consent to waive the objections which have just been stated, and substitute craniotomy without delay. This, then, is a question of great practical importance, and is still receiving, at the hands of the ablest obstetricians, the attention which it merits, but the limits of this work preclude a more extended analysis of the facts which bear upon the subject.

When the pelvic distortion is excessive, and more than one of the diameters is encroached upon to a great extent, as has frequently been observed in malacosteon pelves, it may be quite impossible to deliver the woman by means of any of the operations which we have mentioned; and we may, in such instances, have no resource but the Cæsarian operation or one of its substitutes. What specific conditions may be held to justify the performance of one or other of these operations, we shall afterwards attempt to show; but, in regard to them, as well as the other methods of operative procedure, it is well-nigh impossible to lay down hard-and-fast rules, which may seem, in any strict sense, reliable for our guidance. An attempt will, however, be made to state the measurements, and other conditions, which are held, by the most competent authorities, to warrant the preference of one operation over another.

The above remarks have had reference to cranial presentations only; but it is, of course, to be kept in view that any other presentation may occur along with pelvic deformity, and thus develop new and special considerations. An intelligent combination of the general principles upon which such presentations are to be managed, and an adaptation of these to the special circumstances of the case, will enable the well-informed practitioner to conduct such cases also in a skilful and creditable manner.

CHAPTER XXVIII.

THE FORCEPS.

History of the Forceps.—Chamberlen's Forceps.—The Pelvic Curve.—The Short Forceps.—The Straight Forceps.—Reasons for preferring the Straight Forceps in most Cases.—Circumstances in which the Forceps is Required.—Application of the Forceps: Conditions essential to Safety: Degree of Dilatation of the Os: Membranes to be Ruptured: Blades to be applied to the Sides of the Head: Forceps to be applied in the Opposite Oblique Diameter to that occupied by the Head of the Child.—The Operation: Introduction of the "Lower" and "Upper" Blades in the First Cranial Position: in the other Cranial Positions.

THE subject of operative Midwifery naturally commences by a consideration of the great Prime Mover of Obstetrics, as the Forceps has, not inaptly, been termed. It is scarcely possible to exaggerate the importance of this instrument, which is simple in construction, easy of application, and marvellous in power, and besides, the greater frequency with which we avail ourselves of its aid, as compared with other methods of instrumental and operative assistance, fully entitles it, and its application in practice, to the prominent position in which the subject is invariably placed.

No doubt can be entertained that the ancients discovered, and were in the habit of using, an instrument which, in the principle of its construction, is identical with the modern forceps. The period at which the discovery was actually made will probably never be known. It does not appear that the knowledge of the subject was general, even among the most civilized communities, but it is certain that it was well known to the early Arabian physicians. We thus find it mentioned by Avicenna, and more particularly described by Albucasis, who lived about the eleventh or twelfth century. The latter describes two kinds of forceps, the *misdach* and the *almisdach*, both being, according to the Latin version, circular and full of teeth. It is worthy of note that, in

the Arab original, which Smellie seems to have seen in the Bodleian library at Oxford, the *misdach* is described as straight, and the *almisdach* as curved. This important discovery was, however, completely lost sight of in the gloom of the dark ages, nor was it till near the middle of the seventeenth century that it was rediscovered, and, after a long interval of secrecy, introduced into practice.

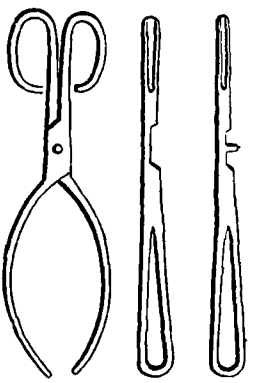
Chamberlen's Forceps.—This discovery, which was made prior to 1647, has been generally attributed to Dr. Paul Chamberlen, but the careful researches of Dr. Aveling[1] have clearly shown that we owe it to Dr. Peter Chamberlen, who communicated it to his sons Hugh, Paul, and another, all members of the profession. The secret seems, however, to have been greedily guarded by the Chamberlen family for their own profit, and Dr. Hugh Chamberlen, who translated into English Mauriceau's work on Midwifery, alludes to it in the preface to that work as late as 1716. Referring to the use of the crotchet, he says, "but I can neither approve of that practice, nor of those delays, beyond twenty-four hours, because my father, brothers, and myself (though none else in Europe, as I know) have, by God's blessing and our industry, attained to, and long practised a way to deliver women in this case without any prejudice to them or their infants; though all others (being obliged, for want of such an expedient, to use the common way) do and must endanger, if not destroy, one or both with hooks." As a sort of apology for keeping it secret, he adds, "there being my father and two brothers living that practise this art, I cannot esteem it my own to dispose of nor publish it without injury to them."

The political troubles of his time obliged Dr. Hugh Chamberlen, on two occasions at least, to fly the country and take refuge on the Continent, where he made various attempts to dispose of his invention. His offer to sell it to the French Government was refused, chiefly on account of the failure which had attended his efforts to deliver a woman upon whom Mauriceau had resolved to perform the Cæsarian operation, and which was therefore a case, as we may assume, quite unsuitable for the operation by the forceps. He was more successful, however, in Holland, where he managed to dispose of his secret to several practitioners, of whom Ruysch, the eminent anatomist was one. From the Netherlands to Germany, where it was used by Solingen, and ultimately to France, the secret slowly spread, until it was a secret no longer, and was recognised in all its importance by the most accomplished accoucheurs of the day. Long before the operation had thus made its way into notice on the Continent, the secret in this country

[1] Obstetrical Journal of Great Britain and Ireland. January, 1875.

had undoubtedly oozed out in some quarter; and, ultimately the midwifery forceps was described and figured by Chapman, in his well-known work, as the instrument used by the Chamberlens. A very interesting discovery was made in the old manor-house of a small estate near Malden, in Essex, which had been purchased by Dr. Peter Chamberlen towards the end of the seventeenth century, and which had remained in the family till about 1715. In an old chest in one of the rooms of this house, there was discovered, in 1818, a collection of obstetric instruments, along with old coins, trinkets, and the like. Mr. Cansardine, into whose possession these relics had fallen, gave an interesting description of them in the Medico-Chirurgial Transactions, Vol. IX. There were several specimens of forceps, showing apparently the various stages of advancement through which the invention passed in Chamberlen's hands before he reached what he believed to be perfection. Fig. 167 shows one of the most perfect of these, in which the blades are fenestrated, and are so constructed as, when separately applied, to be articulated together at the shank by means of a pivot. This instrument, as perfected by Giffard and Chapman, is essentially the same as the forceps most frequently used at the present day, except in so far as the lock is concerned.

Fig. 167.



Sketch of Chamberlen's Forceps.

Up to this time, the handles of all the instruments were, as in the French forceps to the present day, of iron, and the lock was either a pivot, with or without a screw, a sort of mortice lock, like the blades of a pair of scissors, or the blades were clumsily tied together, after their adjustment, by means of a tape or cord. We are certainly indebted to Smellie for the simple contrivance which is known as the English lock, and also for the adaptation of wooden handles, which give a much better hold and purchase. The principle upon which the forceps was essentially constructed was to adjust the curve of the blades with reference only to the spheroidal shape of the child's head, so as to make sure of securing an efficient hold without risk to the child.

Pelvic Curve.—The difficulty in the application of such an instrument as this, when the head was at the brim or at the upper part of the cavity, led to another important modification of the forceps, the credit of which is divided

between Levret and Smellie. It is most likely, however, that the French obstetrician was the real inventor; but it is to be regretted, for the sake of his reputation, that he made a secret of it, as the Chamberlens, to their lasting discredit, had done before. The novelty in question consisted in the adaptation of a second curve in the blades, with reference, in this instance, to the curved axis of the pelvic canal. This is called the "pelvic curve," and is the invariable form of the French forceps of the present day, while, in this country also, the straight forceps has been entirely abandoned by some of the most eminent of our obstetrical authorities. This variety was originally constructed in order to overcome difficulties at the brim and high in the cavity, and it is, therefore, to these that it is chiefly applicable; although, as has been said, many prefer this form in all cases, and allege that it is easier in application, and safer both to mother and child. Although we cannot agree with this, we are not prepared to question the superiority of the pelvic curve in cases where the head is at the brim or high in the cavity.

Short Forceps.—Long and Short Forceps were, until lately, commonly described by English writers as distinct varieties of the instrument, and were sold by the makers under these names. The Short Forceps, as usually constructed, is an instrument about eleven inches in length, the measurement from the lock to the tip of the blades being a little over seven inches. Each blade is fenestrated, the aperture being destined, on each side, to receive the parietal protuberances. The blades are curved, so as to measure between their widest part about three inches, and from tip to tip, when closed, not more than an inch. This instrument, when made without a pelvic curve, is known as Smellie's forceps, and was for long much employed in this country, although it has been almost entirely superseded by instruments of more approved construction. It is scarcely necessary to observe, what is equally applicable to any variety of forceps, that the blades should be made of steel of the finest temper, otherwise they are constantly apt to slip over the head by yielding of the metal. The edges are highly polished, and bevelled off in every direction with great care, so as to avoid the possibility of injuring the scalp of the child or the soft parts of the mother. Covering the blades with leather was once practised, but this has now properly fallen into disuse, as rendering the instrument more difficult of introduction, and more likely to convey infection. Nor is the practice of covering them with a composition of gutta-percha to be commended, and, when properly made, the clean, smooth metal is, on all accounts, to be preferred. The short forceps is suitable for the extraction of the head from the outlet

and lower part of the pelvis; but, if the head is higher in the cavity, this instrument, although it may still be used with difficulty, is not to be recommended when one more efficient is at hand. Its use should be limited to those instances in which it is possible, after adjusting the blades, to close them when the lock is still quite clear of the external parts. If the lock passes within the vulva, there is considerable danger—especially when the woman is under the influence of anæsthetics, and is thus unable to give any evidence of particular suffering—of pinching in some portion of the soft parts, and inflicting serious laceration.

Forceps for Ordinary Use.—To obviate this risk, and at the same time to render the forceps capable of more extended application, we have always advocated the employment, in ordinary practice, of an instrument which is both longer and stronger than the ordinary short forceps. Such an instrument as this, which fulfils equally well all the purposes of the short forceps, is also applicable to cases in which the head occupies the middle third of the cavity, or is even a little higher. In these latter cases, the lock is still external, and the power of the instrument is considerably increased. The handles are stronger, and the blades thicker, than in the old short instrument; for it is a fundamental rule, in the construction of the midwifery forceps, that, for obvious mechanical reasons, we must increase the strength in proportion to the length of the blades. And, in doing so, it is also proper so to construct the handles as to give the operator sufficient power, as no greater error can be committed than to sacrifice power to elegance, or to a dislike to give the instrument a formidable appearance. The following remarks by Dr. Barnes are so apposite to this, that we quote them here. "It has been sought," he says, "to make an instrument safe by making it weak. There can be no greater fallacy. In the first place, a weak instrument is, by the mere fact of its weakness, restricted to a very limited class of cases. In the second place, if the instrument is weak, it calls for more muscular force on the part of the operator. Now, it is sometimes necessary to keep up a considerable degree of force for some time, and not seldom in a constrained position. Fatigue follows; the operator's muscles become unsteady; the hand loses its delicacy of diagnostic touch; and that exactly-balanced control over its movements which it is all-important to preserve. Under these circumstances, he is apt to come to a premature conclusion, that he has used all the force that is justifiable; that the case is not fitted for the forceps, and takes up the horrid perforator; or he runs the risk of doing that mischief to avoid which his forceps was made weak. The faculty of accurate gradation of power depends upon having a reserve of power.

Violence is the result of struggling feebleness, not of conscious power. Moderation must emanate from the will of the operator; it must not be looked for in the imperfection of his instruments. The true use of a two-handed forceps is to enable one hand to assist, to relieve, to steady the other. By alternate action the hands get rest, the muscles preserve their tone, and the accurate sense of resistance which tells him the minimum degree of force that is necessary, and warns him when to desist."

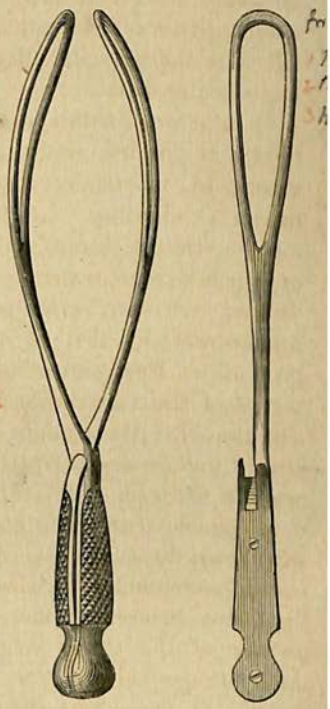
It is, perhaps, natural that an operator should prefer that form of forceps to the use of which he has been trained, and upon which he knows, by experience, that he can thoroughly depend in times of danger or difficulty. In confessing, however, a personal predilection for the straight forceps, it is proper to observe that the majority of experienced practitioners, both in this country and abroad, exhibit a decided preference for the pelvic curve. Personal experience, which is corroborated by that of many able and experienced accoucheurs, prevents us from perceiving the strength of their arguments, or the justice of their conclusions; and we object more particularly to the assertion that the straight forceps is specially dangerous to the child. It may well be that the pelvic curve in the hands of those skilled in its use is equally efficient. That it is so, cannot, indeed, be doubted, and it is possible that, when once adjusted, the danger of slipping is less when used by the inexperienced, but we conceive that such problematical advantages are more than counterbalanced by the following—First, the blades are more easily introduced, with reference to the position of the child's head, if the operator has but one curve to think of; second, the two blades being the same, no mistake can possibly be made between the upper and lower, or anterior and posterior blade; and third, that if it should be found necessary to alter the position of the head by rotation, this can only be effected by the straight instrument.

The forceps, the use of which we recommend to young practitioners, who generally possess but one instrument, is of a size intermediate between the short forceps and what will presently be described as the long forceps. (See Fig. 168.) It is, as already mentioned, applicable for all the purposes of the short forceps, but by means of it we are able to operate quite as easily when the great diameters of the head are on a level with the middle plane of the pelvis, or even higher. It is fourteen inches in length, the blades to the lock being nine, and the handles five inches. The fenestræ are four and a half inches in length, and something less than an inch and a quarter in the widest part. The distance between the blades in the widest part of the curve is

three inches, and at the tips a little under an inch. The handles are lengthened to secure a better hold.[1]

Cases Requiring Forceps.—Cases requiring the use of the forceps are very variable in their general features, but most of them may be referred to one or other of the following groups. We may have, in the first instance, cases in which everything is normal save expulsive power, which may utterly fail as the period of delivery approaches: this failure of the *vis a tergo* is familiarly known as "uterine inertia," and from it arises, more frequently than from any other cause, the necessity for operative assistance. In another group, the operation is rendered necessary by a minor degree of pelvic deformity, at the outlet or in the cavity—of which flattening of the sacrum is an example, probably of more frequent occurrence than is usually supposed. The application of the forceps, when the head is at or above the brim, is less frequently required, and is attended with special difficulties and dangers which will be duly considered. In occipito-posterior positions, and in face presentation, the forceps may be found necessary either for rectification or direct extraction; and, in convulsions, or any condition calling for speedy delivery, it may also be necessary to use the forceps if the labour has

Fig. 168.



Straight Forceps for Ordinary Use.

[1] It would appear that, in some quarters, the words "short" and "straight," as applied to the forceps, are admitted as synonymous terms. This, or (what is only too probable) some confusion in the text, seems to have led to the idea that the author of this work upholds the use of the short forceps. This he would beg to repudiate, and he refers to Fig. 168 and to its dimensions as now stated, in refutation of what has been imputed to him by critics, who in other respects were generous and indulgent to a fault. The instrument here described is, in point of fact, identical, or nearly so, with what is known in Ireland as Beatty's forceps, and is almost of the same dimensions (although stronger in construction) as a straight forceps described by Dr. Graily Hewitt some years ago. The young obstetric practitioner should have nothing to do with the short forceps, unless he be so circumstanced as to have nothing better at hand.

sufficiently advanced to admit of the safe application of the instrument. Some of the rarer circumstances calling for the forceps have already been mentioned, such as certain exceptional cases of rupture of the uterus, placenta prævia, or funis presentation. In cases of breech presentation, or after turning, it is sometimes necessary to apply the forceps, when the trunk has been born, in order to extract the head from the soft parts and protect the child from suffocation. The instrument, being specially constructed for application over the spheroidal cranium or to the face, is only applicable, as is evident, to a limited class of cases.[1] For other presentations, therefore, which may require operative assistance, special mechanical aids must be sought, and, in the case of the breech, a special forceps has actually been constructed. The necessity for operation by the forceps arises more frequently in primiparæ than in women who have already borne children.

Application of the Forceps.—Before, in any case, making the slightest attempt in this direction, we must be sure that neither the bladder nor rectum are distended, and this caution is specially required as regards the bladder, from which the contents must, if necessary, be withdrawn by the catheter. An essential condition, according to all authorities, is complete dilatation of the os, but some difficulty unfortunately seems to exist in determining what we are to understand by "complete dilatation." The cases which are undoubtedly most favourable for operation are those in which the os is absolutely obliterated or drawn up beyond the reach of the operator over the advancing head. But if we limit the employment of the instrument to these cases alone, we shall certainly withhold assistance in many in which we might deliver the woman with perfect safety. Obliteration of the os, or actual continuity of the uterine with the vaginal canal, is no doubt desirable, but we must not admit as true the statements of those who tell us that it is essential to safety. To wait until the lip of the os can no longer be felt, as some have said, is to wait for what may possibly never occur; and, in like manner, if we accept the rule as correct that we are never to pass the blades of the forceps within the uterus, we may allow the period to pass at which we may, by prompt action, save the life of the child.

Complete dilatation of the os is indeed, in a sense, absolutely essential, and it is certain that a greater degree of dilatation is necessary for this than for any other of the operations for delivery. But complete dilatation, in the sense which we would attach to the term, does not

[1] In breech presentation, the ordinary forceps has often been tried, but experience has shown that its use is neither attended with success nor devoid of danger.

imply that the anterior lip of the os has passed out of reach beyond the head, but merely such dilatation as will admit of the safe and easy passage of the blades. In many cases, then, we are justified in passing the blades partly within the uterus; and, although it is quite proper to wait as a rule for what we call complete dilatation, all that is absolutely essential is such dilatation as may admit of the passage and adjustment of the blades without danger of laceration. There can be no doubt that, in a considerable number of cases, recession or retraction of the os, and especially of its anterior lip, does not occur immediately upon full dilatation, nor, it may be, for a considerable period thereafter.

Feeling the Ear.—The possibility of feeling an ear has been very generally looked upon as an important and, by some, an almost essential condition, in the absence of which we would never be justified in operating. That the ear may often be reached with ease, when the other operative conditions are fulfilled, is undoubted, and, in cases in which we are only called in when a large caput succedaneum has in some measure obliterated the landmarks on the surface of the cranium, it is really important that we should seek for and observe the ear, with the view of determining the exact position of the head. But to accept this as a rule for our guidance in every case, is both unnecessary and improper, as the ear, in some cases in which we may hold the operation to be perfectly justifiable, can only be reached with difficulty, or with an amount of violence which may greatly aggravate the sufferings of the patient.

Membranes to be Ruptured.—The forceps must be applied directly to the surface of the child's head, and it is therefore absolutely necessary that the membranes be ruptured, should this not have already spontaneously occurred. We have been summoned with a view to delivery by the forceps in a case in which it was stated that the os was fully dilated, although it turned out that the os was still very slightly dilated and only reached with difficulty in the posterior part of the pelvis, the thin uterine wall being still extended over the surface of the scalp. Such a condition could, with ordinary care, scarcely lead to an error in practice, but the possibility of a mistake should nevertheless be borne in mind by the inexperienced.

Head seized by the Sides.—If possible, but with exceptions to be afterwards noticed, the blades should be applied to the sides of the child's head. To do this with accuracy, it is necessary that the actual position of the head be made out with perfect certainty. This may be ascertained, as has been explained in a former chapter, by a

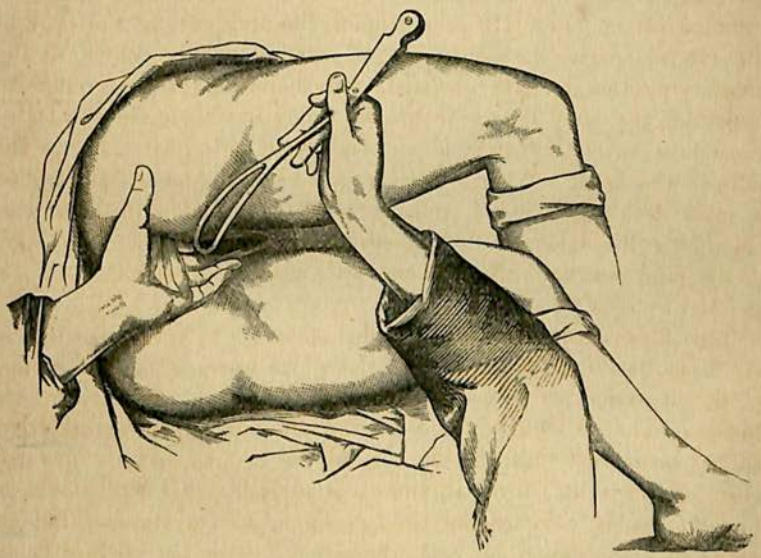
careful examination of the sutures and fontanelles, and of the relation which these parts bear to the pelvic canal; and, as there are four possible cranial positions, we must first be sure with which of them we have to deal, before we take the instrument into our hands. It is only, as we have said, when exceptional difficulties exist that we require to examine the ear. No one, therefore, is qualified to attempt delivery by the forceps unless he is familiar with the laws which regulate normal parturition and there is, in fact, no operation or contingency in midwifery practice in which a thorough knowledge of the mechanism of labour, in all its details, is so essential as this. It is unnecessary to inform any one familiar with the details of normal parturition, that the method of application will depend upon the situation of the head. In proportion to the proximity of the head to the external parts, the movement of rotation will be found, in the ordinary position, to have occurred, and, therefore, the nearer it is to the outlet, the more do we require to apply the blades in the transverse diameter of the pelvis, in our endeavour to adjust them to the sides of the head. When, however, the head is higher, its position is more decidedly oblique, and, even at the outlet, a little of this obliquity still obtains; so that, to ensure their application to the sides of the head, we must apply them *in the opposite oblique diameter to that in which the child's head lies.*

The Operation.— Having satisfied ourselves as to the position of the head, and that the conditions exist which warrant the performance of the operation, we prepare the forceps by warming and greasing the blades. The patient, who lies in the ordinary midwifery position, should be carried quite to the edge of the bed, so that her hips may even project a little over it, and it is advisable that she should be brought, before commencing the operation, into a state of full anæsthesia. We should be perfectly satisfied with her posture before commencing the operation, as a change in this respect, after one blade has been introduced, is not free from risk. If the head is at the outlet and resting on the perineum, the blades are to be introduced, so that the handles shall be directed *forwards* under the pubic arch; if rotation has not yet occurred, and the head is consequently in the lower part of the cavity, they will, with reference to the erect posture, be directed *downwards;* and, if the head is higher in the pelvis, they will be directed more or less *backwards* towards the perineum. If, however, it is still high in the pelvis, or at the brim, we should use the double-curved long forceps; for, our object being to apply extracting force in the axis of that part of the pelvis which the head occupies, we must discard the straight forceps if we find that the shanks of the

blades press upon the fourchette. This we do for various reasons, to be afterwards more particularly explained in connection with the subject of the double-curved forceps, not the least of which is the danger to the integrity of the perineal tissues which would accrue in an attempt to pull the head backwards in a direction even approaching to the axis of the brim.

Let us suppose the head to be in the position which in seventy per cent. of cranial presentations it occupies—in the right oblique diameter, with the forehead towards the right sacro-iliac synchondrosis, and the occiput to the left foramen ovale. The blades, in this case, are to be

Fig 169

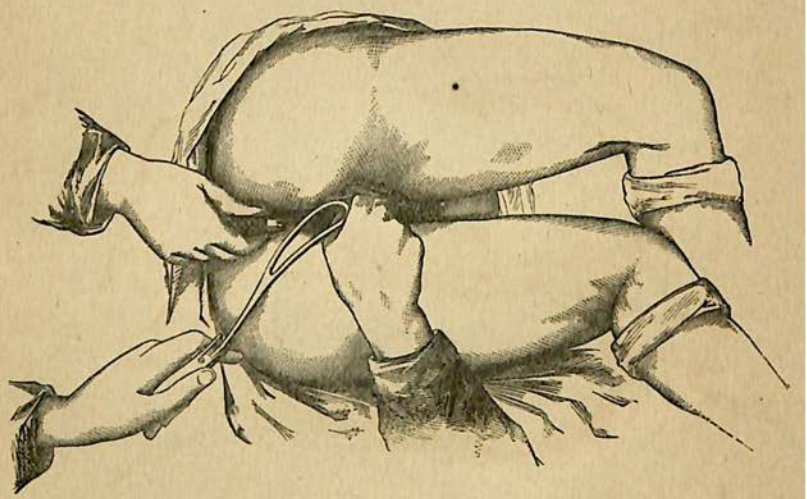


Introduction of the Lower Blade.

passed in the direction of the left sacro-iliac synchondrosis and the right foramen ovale, or, in other words, to the poles of the left oblique diameter of the pelvis. With reference to the position of the woman as she lies on her left side, we speak of the "upper" and "lower" blades. It is of no great importance which of these blades is first introduced, but it is proper that the operator should have a definite plan of procedure, which he may adopt in every case. If he introduce, as we are in the habit of doing, the lower blade first, he grasps one of the blades with the fingers of his right hand as he would a catheter, and holds it for a moment diagonally across the breech of the woman, with the con-

cavity of the blade turned towards her, the point downwards and to the left, the handle upwards and to the right. If thus held, it will correspond to the left oblique diameter, and from this it should not deviate or twist in any way during its introduction. Two or three fingers of the left hand, which have been duly anointed, are then to be passed into the vagina, over the left ischial tuberosity, in the direction of the corresponding sacro-sciatic ligaments, with the palmar surface upwards, until the head is reached. The blade is then passed along the fingers, and, if the os is still distinguishable, it is to be carefully guided within it. If the handle is now gradually depressed, and at the same time gently pushed onwards, it will

Fig. 170.



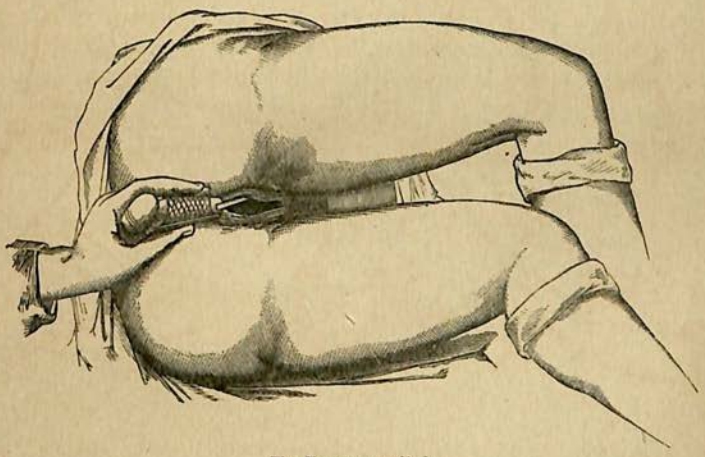
Introduction of the Upper Blade.

generally glide over the convex surface of the cranium without the slightest difficulty or danger. Should the blade turn or twist in the direction either of the hollow of the sacrum or of the foramen ovale, it is on no account to be replaced forcibly, but is to be partially withdrawn by raising the handle, and re-introduced with greater care. The handle is then carried towards the perineum, and intrusted to an assistant while the introduction of the upper blade is being effected.

The operator should take the second blade with his left hand, so that it diagonally crosses the breech as before, but with the point above and to the right, and the handle downwards and to the left. The fingers

of the right hand are then passed in the direction of the right foramen ovale until the head is reached, and along their palmar surface, which is turned downwards, the blade is then to be introduced. The reason for bringing the woman quite to the edge of the bed now becomes obvious, as it is only in this way that the handle of the upper blade can be sufficiently depressed to admit of its easy introduction. This blade is introduced, as will be observed, *in front* of the lower blade, as it is only in this way that the two parts of the forceps will lock.[1] The hand is now to be steadily raised, when, under the direction of the fingers, the blade will glide over the right side of the child's head. An excellent guide during this part of the operation is derived from an observation of the inner or metallic surface of the handle, which should remain parallel with the corresponding surface of the lower blade, and the

Fig. 171.



The Forceps applied.

earliest deviation of the blade from its proper course will be found in an inclination of this surface to one side or another. Should this occur repeatedly, after partial removal and re-introduction of the blade, it may be advisable to withdraw the lower blade, and introduce it with reference to the other, as there is the possibility of a mistake having been committed as to the position of the head, and it is besides a matter

[1] We have frequently observed that students who may be practising these details with the machine and phantom commit the error of passing the second blade without any reference to the direction of the lock in the first. This error cannot possibly be committed in practice if the directions here laid down are observed.

of far greater importance to have the blades exactly opposite to each other, than to have them accurately adapted to the transverse diameter of the head. The best test of a proper application of the forceps is the perfect locking of the blades after their introduction. Fig. 171 shows the blades as adjusted for the first position, the head being in the pelvic cavity, as is indicated by the direction of the handles. The blades being separated by the transverse diameter of the head, the extremities of the handles are about an inch apart.

When the head occupies the second cranial position, the blades are to be applied to the poles of the right oblique diameter. The lower blade is therefore introduced in the direction of the left foramen ovale, from which point the handle is first directed upwards and to the left, and then depressed downwards and to the right. The upper blade is then introduced in the direction of the right sacro-iliac synchondrosis, taking care that it is passed in front of the lower blade, and that the metallic surfaces of the handles retain their parallelism as before. In the third position, the forceps must be applied in exactly the same way as when the head is in the first; and in the fourth position as for the second.

CHAPTER XXIX.

THE FORCEPS (CONTINUED).

Action of the Forceps: 1, by Compression; 2, by Traction; 3, by Leverage.—Mode of Extraction: Management and Direction of the Handles at various Stages of Delivery.—Delivery by the Forceps in Occipito-Posterior Positions: Rotation by the Forceps: Extraction with the Forehead Forwards.—The "Long Forceps": Reasons for Preferring the Pelvic Curve in this Operation: Description of the Instrument: Cases in which the Long Forceps is applicable: Directions for the Operation: Blades to be applied to the sides of the Pelvis: Mode of Introduction of the Lower and Upper Blades: Relation of the Blades to the Surface of the Cranium.—Use of the Forceps in Presentations of the Face.—Procedure when the Head is retained after Expulsion of the Trunk.—Modifications of the Instrument: Ziegler's, Radford's, Assalini's, Tarnier's and other Forceps.

THE forceps acts mechanically in three different ways in effecting the object which we have in view; by compression, by traction, and by leverage. In so far as Compression is concerned, a certain degree of this is essential, in order to grasp the head with the blades, which otherwise would slip off, or would only be precariously maintained in their position, under certain circumstances, by the pressure of the walls of the parturient canal. But by compression something more is implied than mere grasping, for by it, as is obvious from the yielding nature of the sutures and fontanelles, the actual diameters of the cranium may be materially diminished. We may, assume, however, that the degree of pressure which is necessary in order to ensure such a grasp of the head as may render it impossible for the blades to slip under moderate efforts, will effect all the compression which is desirable. It was at one time the usual practice that a piece of cord or tape should be firmly tied round the handles in order to keep up sustained pressure on the cranium, and it is for this that the depression near the

extremities of the handles, which is characteristic of all English forceps, is intended. But this mode of procedure is not to be commended, as such serious and sustained pressure may endanger the life of the child. The power exercised by the hands of the operator, if only the handles are of proper size, is quite sufficient for his purpose, and, being necessarily intermittent, is free from the danger which attaches to continuous pressure upon structures so delicate and important as are contained within the cranium. Sometimes, when it is necessary to use very considerable force, the full extent of possible compression must be resorted to, but this more with the view of maintaining a secure hold than of gaining much by mere compression. In such a case, the corner of a towel which has been dipped in water may be tightly bound round the handles at the depression alluded to, when the remainder of the towel being wrapped round the handles will give a better hold and more power; but, when this is done, the pressure should always be relieved during the intervals between the pains, or when at any other time we make a periodical pause in our extractive efforts. The amount of compression which is safe will depend in no small measure on the construction of the forceps; and, in instruments, such as are many of those of French manufacture, with an interval of half an inch only between the tips, the pressure will certainly be attended with more risk than when these are, as they should be, an inch or nearly so apart.

The forceps acts further, and indeed mainly, by Traction. This force may be applied either alone, or in combination with a third mode of action of the instrument, that which involves the principle of Leverage, often described as a double-lever action. The forceps, as almost invariably constructed with the English or other similar lock, is composed of two levers—the fulcrum of each being the lock. This enables us, by a swaying movement of the hands, to apply extracting force, partly by leverage and partly by traction, to each side of the head successively, without the danger which attaches to the single lever or vectis, where it is necessary to find a fulcrum in some part of the pelvic wall. Care must be take, however, not to carry this double-lever action too far, for there is no doubt that when we sway too much there is both loss of power and increase of danger. The more important action undoubtedly is steady traction in the proper axis.

The Ordinary Operation.—When the blades have been adjusted to the satisfaction of the operator, he now proceeds to the actual operation of extraction. As his object should, in most cases, be rather to aid than to supersede the natural efforts, he must merely assist the pains should they be present, and pause when his assistant informs him that the uterine action has ceased. This leads us to observe, that, if it be

practicable, the assistance of another practitioner should always be obtained; for not only is there thus a division of responsibility, but the operator has the great advantage of efficient and intelligent aid, to which he can trust for the management of chloroform, the steadying of the uterus, and many other points of detail, which it is impossible to obtain at the hands of those who are ignorant or inexperienced.

When the action of the uterine fibres has ceased—as in cases of complete inertia—he should imitate nature by applying extracting force at intervals corresponding to the ordinary duration of natural pains. The handles should be grasped by both hands, two of the fingers of one hand being passed up so as to impinge upon the head. The object of this is to ascertain the earliest indication of slipping of the blades, which is always apt to occur when the distance between their extremities is more than an inch, or when they are faulty in temper. So soon as he feels that his fingers are leaving the surface of the scalp under the influence of his efforts, he knows that the instrument is losing its hold. The blades should then be disarticulated and pushed back to their original position; and, upon renewed efforts, he makes use of a little more compression, thus striving always to effect the dislodgment of the head with as little of actual force as may be necessary. The force should be applied as nearly as possible in the direction of the axis of that part of the pelvic canal within which the head lies, and the operator should pull steadily, with or without a slight swaying motion of the handles from side to side.

If the head is by these efforts dislodged from the situation in which it has been arrested, and moves downwards into a lower plane of the pelvis, this may, in the presence of efficient pains, be all that is required, as nature in some cases will often complete the delivery. It is better, however, at this stage, not to withdraw the blades, but merely to disarticulate them, and, leaving them in contact with the head, watch the result. If the head now moves satisfactorily with every pain, they may be entirely withdrawn; but, so long as there seems a probability of further assistance being required, it is better to leave them than to run the risk of having again to apply them at a more advanced stage of the labour. If it is a case of inertia, or if there is obvious obstruction at the outlet, our efforts must be continued at intervals as before; resting satisfied with a very gradual advance, and never (unless under exceptional circumstances, when rapid extraction is imperatively demanded) striving for a too speedy termination of the case, which might endanger the perineum and the other soft structures which nature in normal cases very gradually distends.

The direction which, in labour, the head naturally takes is always to

be kept in mind. As it descends, therefore, if it has originally been in the cavity when the blades were introduced, the handles are to be carried forwards under the arch of the pubes, and, at the moment of birth, are to be raised in front of the symphysis. It is at this moment that hurry or violence of any kind is apt to lacerate the perineum, so that we should, by every means in our power, closely imitate the process by which nature so admirably effects the dilatation of this structure. It is usual to practise what is called support of the perineum in forceps as in ordinary cases, but in such means, as a preventive of laceration, we have, for reasons already stated, no confidence whatever. As the head passes from the cavity to the outlet, the natural movement of rotation is not to be forgotten. It is not, indeed, necessary that we should attempt artificially to produce this rotation. Under the influence of the ordinary causes, nature will effect it at the proper time, whereas we might only do harm by misplaced efforts before that time has arrived. Still, it is proper that we should watch the first indications of rotation, and, in our subsequent endeavours, "humour" the blades so as in every way to encourage it.

The situation on the sides of the child's head which corresponds to the blades varies considerably, and will depend, in some measure, on the degree of moulding or elongation which may have occurred. When successfully applied, so as to obtain the best possible hold, the tips of the blades will be found to have passed over the ears, and to have grasped the soft parts of the cheek beyond the zygomatic arch. In not a few cases, however, and especially in those in which the forceps has been used before the head has attained the perineum, they do not reach so far, and in these the point attained will be marked by a depression in the temporal region above the zygoma. Beyond the depression just mentioned, the injury inflicted upon the soft parts of the child should be very trifling, even in severe cases. A certain amount of discoloration, from bruising, is sometimes noticed, but this disappears in the course of a few days.

In Occipito-Posterior Positions.—In the third and fourth, or occipito-posterior positions, the difficulties which we encounter are often much more formidable. These difficulties, it is to be remembered, possibly depend entirely on the faulty nature of the position, and we should therefore refrain as long as we can from interfering, in the hope that nature may come to our aid and effect the usual rotation. But, should the time arrive when operative assistance is imperatively required before spontaneous rectification has been effected, our first attempts should be to remedy these positions, by promoting the rotation which would bring the occiput forwards. Having failed in our attempts

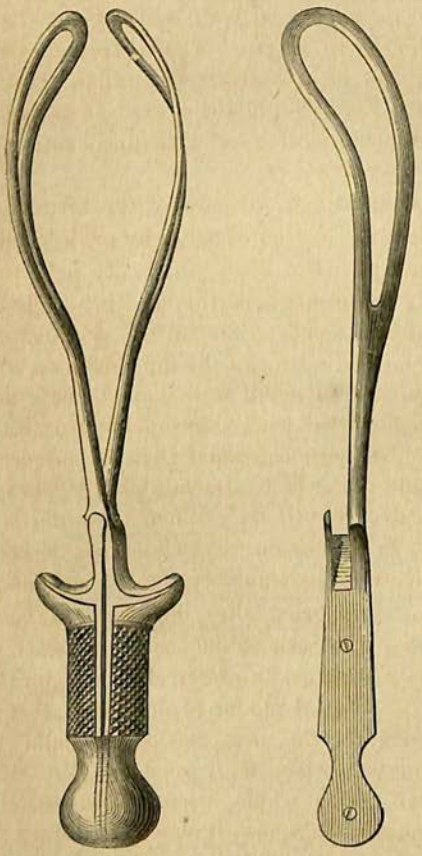
to induce this rotation by the fingers, with or without the vectis, in the manner formerly described (see Chap. xviii.), we may then try to effect rotation by the forceps, previous to attempting direct extraction, always remembering that our prospects of success in this are very doubtful. Very special care is here necessary, as a moment's consideration will show, to distinguish between the two occipito-posterior positions. If, for example, we should mistake the third position for the fourth, we would apply our rotating force so as to move the occiput from right to left in an attempt to reduce it to a first position, with the result, if we moved the head at all, of forcing it in the direction of the conjugate diameter, and thus making matters worse, instead of better. If, however, we are confident in our diagnosis, we have only to remember that third positions rotate naturally into the second, and fourth into the first, which at once points to the direction in which alone rotatory force can safely be expended. Dr. Tyler Smith says that we should rotate during the process of extraction; but it is better that we should, in the first place, attempt simple rotation, and then, if that fail, combine rotation with extraction. If we succeed in effecting rotation, the case, left to nature, will terminate in the usual way. But, should we fail, it will be necessary to extract directly, without rotation—a matter often of considerable difficulty.

In delivering by the forceps, while the head remains in an occipito-posterior position, care must be taken to conduct the operation with a due regard to the manner in which nature effects delivery in such cases. If we attempt to drag the head forwards under the pubic arch, we shall probably fail; so that we should direct our efforts so as to get the occiput over the perineum—as it is only in this way that the occipito-mental diameter can be released—and the forehead is then suffered to sweep backwards from behind the symphysis. The great danger is rupture of the perineum, which, in some instances, it will be almost impossible to avoid; but, when the pelvis is of good size, the difficulties attending delivery in such a position are by no means so great as might be supposed.

Long Double-Curved Forceps.—Whatever opinion may be entertained as to the propriety of employing the forceps with a double curve in all cases, without exception, we have no doubt that the long forceps, as applicable to cases where the head is at or above the brim, has a decided advantage when constructed on this principle. The objection to the long straight forceps in this situation is pretty obvious, if we reflect that extraction, exactly in the axis of the brim, is impossible, as the line representing that axis passes through the coccyx, or even the lower part of the sacrum. It is not, indeed, until the head has fallen

well into the cavity, that it may be supposed to occupy a plane the axis of which passes in front of the perineum. Not even with the pelvic curve can we pull directly in the axis of the brim, but we are able more nearly to approach to what is desiderated, and, what is much more important, to do so with comparative safety. If the straight forceps is used at the brim, not only do we pull the head too much forwards, but we do so to the imminent danger of the perineum, against which the shanks of the blades are pressed. And, if we overcome the first resistance, the widening of the blades as they descend exposes this structure to ever-increasing danger as the child advances, for it is not till the head reaches the lower third of the cavity that we can bring the handles forwards. The risk to the perineum is, no doubt, much lessened, if we use an instrument in which the shanks are approximated for some distance, so that the curve of the blades springs from a point several inches from the lock, as in a modification of Beatty's forceps, which has been very commonly used.

Fig. 172.



Forceps for Application at the Brim.

In the construction of this variety of long forceps, bearing in mind the rule already laid down, our first point is to ensure strength without clumsiness. There is good reason to believe that the neglect of this precaution has been the cause, in many instances, of the instrument slipping again and again. There is no necessity for the blades, if of proper material, to be of great thickness, but the handles should always be large, of sufficient size indeed to be firmly grasped by both hands. Endless varieties and modifications of the long curved forceps have been devised, and it is but natural that every operator should prefer

his own. The instrument here shown (Fig. 172) is somewhat similar to what is known in this country as Simpson's forceps, which was adapted by him from the pattern of that used by Naegele and other German accoucheurs. The joints are made so loose as to admit of very slight lateral motion or overlapping, and below the lock there are transverse rests which give more power to the hands; "the long forceps," as Simpson observes, "being only properly used as an instrument of traction, not of compression." The length of the instrument which we have represented here is sixteen and a half inches, being ten and a half inches from the lock to the tip of the blades, and six inches for the handles. The measurements between the blades should be the same as those of the medium sized instrument above described, and the fenestræ about five and a half inches in length. The instrument is thus, as is believed, both longer and of greater strength than those which are generally employed by English practitioners. It is, we believe, inferior in efficiency to none, and, if used with due caution, equal in point of safety to any.

The long forceps, in the sense in which we employ the term, is applicable to cases in which the head will not enter the brim or descend beyond the upper part of the cavity. The cases which are held to warrant its employment are chiefly those in which the head is arrested at the brim by reason of moderate contraction of the conjugate diameter. Great care must therefore be taken, in the first instance, to ascertain the degree of deformity, and to make sure that the case is really one in which the forceps may be used with a reasonable prospect of success, for if not, nothing can be more irrational than to subject the woman to the not inconsiderable risk which attaches to this operation, even under the most favourable conditions. When the child is dead, and the estimated difficulty in extraction is considerable, most accoucheurs would prefer to deliver by craniotomy, but if, on the contrary, there is evidence of the child being alive, nothing can be more repugnant to the feelings than the idea of an operation which deliberately destroys a life, and we will naturally prefer any procedure which may give the child a chance. To yield too far to this inclination would, however, be manifestly wrong, for the mere fact of the child's life need not enter into the calculation when it is obvious that it must, sooner or later, be sacrificed. Our whole attention, in such a case, should be centred on the mother, in whose interests, therefore, we should decide upon that operation which is likely to subject her to the least possible risk.

But it is not against craniotomy alone that the long forceps may be balanced, for there are cases in which the question for decision is

between the forceps and turning, as will be better understood when we come to consider the conditions under which we have recourse to the latter operation. It has been said that the forceps is a "child's operation," but we would take a very narrow and improper view of the scope of the instrument did we conclude that it was always so, and that it was inapplicable in the interests of the mother. The results of craniotomy are, according to. Churchill, about one maternal death in five, and we may be sure that when the head is high in the pelvis the figures will be more unfavourable still. Nothing can be more absurd, therefore, than to assume that, in so far as the mother is concerned, craniotomy and the long forceps stand to each other in the relation of safety and danger; and yet it would almost seem that this was the idea which prompted some, even in modern times, to declare in favour of the former.

The operation by the long forceps is one to which, as a rule, a certain degree of difficulty and danger is attached.[1] This arises from the peculiar circumstances of the case, as compared with the ordinary forceps operation. There can scarcely be a stronger contrast than between a case requiring the application of the ordinary forceps, when the head lies upon the perineum and is arrested by simple inertia, and one in which a contracted brim prevents the head from entering the pelvic canal. In the one, we have the operation in all its details so thoroughly within our control, that we almost cease to look upon it with the slightest apprehension. In the other, we are operating comparatively in the dark, and at great mechanical disadvantage; we have to subject, to an extent which we cannot fully be aware of, delicate textures to violent compression; we have to drag the head through the whole length of the pelvic canal, instead of merely disengaging it from its lower extremity; and, finally, we have to determine between the amount of actual obstruction and the degree of justifiable force, with a nicety upon which success or failure will depend. Is it, then, to be wondered at that the operation is looked upon with apprehension, as one beset with difficulties and dangers?

While we freely admit that the objections with which delivery by the long forceps is beset are in themselves sound, we must, at the same time, express our conviction that they have been, to a great extent, exaggerated, and that more by British than by Continental and American obstetricians. We see no reason to doubt that, when skil-

[1] The operation here described is often designated the "high operation," an expression which, on many grounds, is to be preferred. It is clear at least that an instrument which proves efficient at or above the brim must be equally effectual at a lower level in the pelvis.

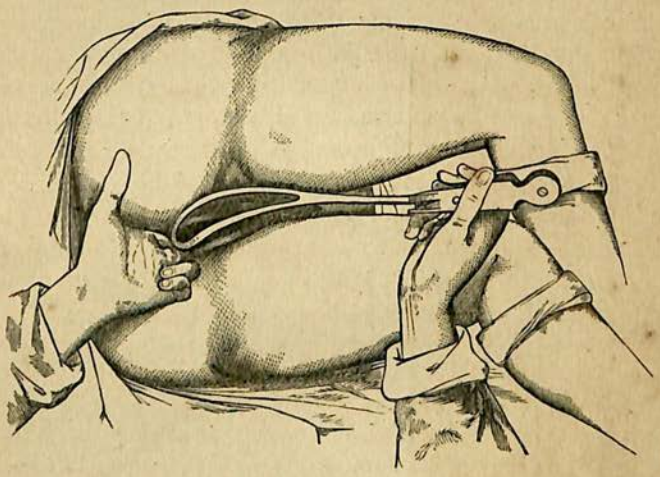
fully and warily employed, the best results will, in many instances, follow from its use—the one essential element which, above all others, will contribute to success, being a careful selection of proper cases. It is now very generally believed, by those who have had the greatest experience, that a large proportion of the unfortunate results depend upon improper instruments, and especially upon the use of such as are deficient in power. The observations which, on this point, we have already quoted from Dr. Barnes, apply here with peculiar force. Power and control are correlative factors towards the attainment of the result which we desire, and, if there is a deficiency in the former, we can have but little confidence in the issue of the case.

The Forcpes at the Brim.—As regards the mode of application, the long forceps differs in many essential particulars from the other. Exceptional cases may no doubt occur, in which the forceps is applied at the brim to effect delivery, which is called for in consequence of inertia, hæmorrhage, and the like; but, in such cases (in which we may assume the pelvis to be of normal dimensions) the operation of turning will generally be preferred. Delivery by the long forceps may practically be considered as an operation in which the head is arrested by reason of contraction of the pelvic brim. Our object, then, is not to apply the blades in the opposite oblique diameter of the pelvis to that occupied by the child's head, so as to secure their adaptation to the sides of the cranium, but rather to introduce them with special reference to the pelvic walls, so as to be sure that each passes along the side of the pelvis, and is thus opposite to the other, in or near the transverse diameter of the brim. When the head is still above the brim, it usually occupies, as we have seen, a position which is more transverse than oblique, and the effect of conjugate contraction at this part is to maintain that position even after the head has actually engaged in the brim. Were we here to follow the usual rule, and did we succeed in applying the blades in that way, their grasp would be in the conjugate diameter, and in every effort we would run the risk of subjecting the soft parts of the mother to injurious pressure between the blades and the poles of the conjugate measurement—the chief danger being posteriorly against the projecting sacral promontory. Consequently, we must discard all preconceived ideas and rules, and pass the blades in the direction in which there is most room.

The patient may here also lie on her left side; and there is this advantage in the double-curved forceps, that there is not the same necessity for bringing the hips over the edge of the bed, as, from the nature of the pelvic curve, the handle of the upper blade does not require to be nearly so much depressed. The rules given for the introduction

of the blades in these cases vary considerably. We prefer, as in the case of the ordinary forceps, to pass the lower blade first. Some operators, following the advice of Madame Lachapelle, pass this blade along the sacro-sciatic ligament; but the most experienced of modern authorities prefer to pass it over the perineum into the hollow of the sacrum, a little to the left of the middle line. If the former method be practised, the handle must be directed somewhat to the right, although much less so than in the case of the straight forceps. If, on the contrary, the operator should select, as we would recommend, the second process, the blade may be directed, as is here shown (Fig. 173), pretty nearly in a horizontal position, into the hollow of the sacrum. That the introduction of the double-curved forceps is a more complicated proceeding than the

Fig. 173.



Introduction of Long Pelvic-curved Forceps.

operation previously described, no one will dispute; and this indeed will appear from the description of this stage of the process given by Barnes:—"As the point of the blade" he says, "must describe a double or compound curve—a segment of a helix—in order to travel round the head-globe, and at the same time to ascend forwards in the direction of Carus' curve so as to reach the brim of the pelvis, the handle rises, goes backwards, and partly rotates on its axis. The handle is now carried backwards and downwards to complete the curve of the point around the head-globe, and into the left ilium. Slight pressure upon the handle ought to suffice. This will impart *movement* to the blade; the right direction will be given by the relation of the sacrum

and head. Dr. Barnes further illustrates this by the following diagram (Fig. 174), which we have slightly modified.

The actual introduction of the blade is by no means so difficult, nor is it a matter of such nicety as the above description would seem to imply. The most scrupulous care should in every case be taken in guiding the blade by the fingers within the os uteri; and, when this has been effected, the mere raising of the handle after the blade has been so

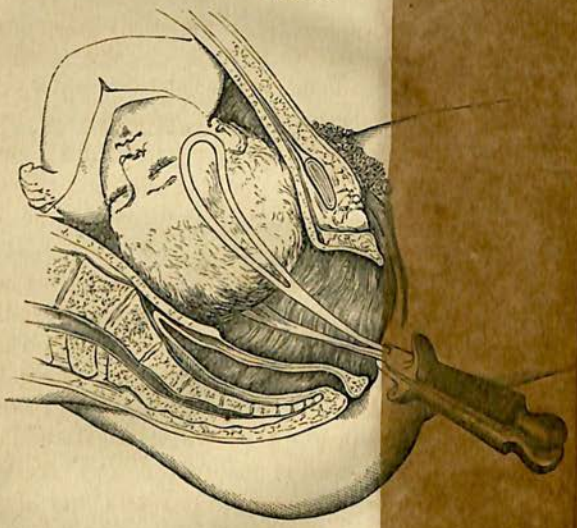
Fig. 174.

Diagram, showing the various Stages in the Introduction of the Long Forceps (Lower Blade).

far introduced, causes it to glide upwards, unless some obstacle should exist to impede its progress. When thus adjusted to the side of the head, the weight of the handle will tend to keep it in position, but this will be more certainly effected by intrusting it to an assistant, who should hold it back towards the perineum to facilitate the introduction of the opposite blade. As in the case of the other, this blade may also be

passed in the direction of the hollow of the sacrum, and is carried in front of the lower blade, to the right of the middle line. The handle being now depressed and carried backwards, its movements direct the blade along the convexity of the child's head towards the right ilium; and, when the movement is complete, the handles should be in apposition and lock easily. Success in this will, however, depend upon the extent and nature of the distortion; but, if the lateral walls of the pelvis are normal as regards their various planes, no great difficulty, after a little practice, will be experienced in the introduction and adjustment of the blades. The facility with which the lock is adjusted may be looked upon, not only as evidence that the blades are in contact

Fig. 175.



Long Forceps Applied

with opposed surfaces of the head, but also that the case is one in which we may hope for a favourable result. But if, on the contrary, we do not succeed in introducing and locking the blades, after one or two attempts carefully conducted, we must abandon the case as one unsuitable for the operation.

It is assumed by many writers that the blades, when thus introduced, correspond to the antero-posterior diameter of the head. It is not so, however. The head, indeed, very generally occupies the transverse diameter of the pelvis, but the tendency of the blades is to adapt themselves to one or other oblique diameter, as has been shown by Simpson. This has been conclusively established by examination of

the head, after delivery by this process, when it is found that one blade has passed behind the ear, and the other has reached over the frontal bone on the opposite side, and has been applied over or in the immediate neighbourhood of the orbit, as is indicated in Fig. 175.

The forceps being thus applied, the next step in the process is an attempt at extraction. Remembering the power which we possess in so formidable an instrument as this, we must, in the first place, exercise great caution in the matter of compression; and this point is all the more necessary, as the handles will be found to gape more than usual, owing to the length of the cranial diameter which is between the blades. Moderate compression is all that is necessary to maintain the position of the forceps when well applied, for we know that it is not by manual compression only, but also by compression of the blades by the walls of the natural passage, that their grasp is sustained. The handles are to be seized by both hands and steady traction practised, the direction at first being somewhat backwards. As in the case of the ordinary forceps, the traction must not be continuous, but in aid of present, or in imitation of absent pains; and, at the same time, we may combine with mere pulling effort a moderate degree of the swaying or double-lever action, taking great care not to injure the perineum.

The thorough control which the size of the handles gives us over the instrument enables us to perceive, with greater accuracy, whether or not the head can be dislodged by such efforts as we are justified in making. This may be more exactly ascertained by passing the finger from time to time in the direction of the head, when the descent of the occiput, or the rotation of the sagittal suture towards the conjugate diameter, may afford clear evidence that the head is making progress. As it descends, the handles of the forceps will be observed to rotate, and in some cases it may be possible to assist the rotation. When this stage has been reached, it will be proper to carry the handles more forwards, and to pull rather downwards than backwards, following the curved axis of the pelvic cavity. Finally, the operator must carry the handles forwards and upwards in front of the symphysis; and, in order that this may be effected with ease, the right thigh should be raised by the nurse, or the patient may be laid on her back so as to permit the handles to move upwards in the direction of the umbilicus. The operator must, however, beware of moving the handles prematurely in this direction, as he may thereby do mischief. And there is another danger which he must specially avoid, viz., the ploughing up of the perineum by the blade which, in consequence of the rotation, is now turned against it. This may, no doubt, be avoided by disarticulation of the blades as the

head approaches the outlet; but, as it is often necessary to continue the traction to the last, extreme caution must at this stage be observed. In nothing should we be more particular than in the slowness and deliberation with which we conduct the various stages of this operation; for, in all the details, the more closely we are enabled to imitate nature, the more likely is the operation to have a successful result.

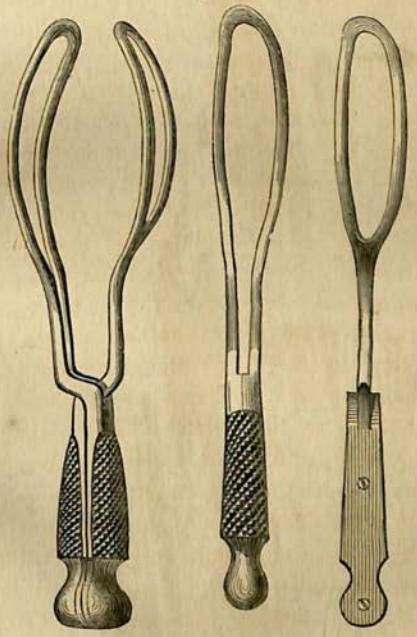
Forceps in Face Presentation.—It may be necessary to apply the forceps in the treatment of presentation of the face. So long as the chin is turned forwards, as it is in what we have described as the third and fourth positions, the case is in all respects a normal one, and should be left to nature. But inertia, and the other causes which call for the forceps in a cranial position, may, in this case, exist also, and demand instrumental assistance. The application of the forceps is here in no respect more difficult, nor more serious, than when the vault of the cranium is the presenting part, the chin being regarded throughout as strictly analogous to the occiput in the mechanism and direction of its birth. The rules, therefore, which have been laid down for its application in occipito-anterior positions of the vertex, may here be adopted, *mutatis mutandis*, with equal propriety. It is very different when we have to deal with a mento-posterior position of the face, which is by far the most unfavourable of all possible presentations of the cephalic extremity. Such is, as we have seen, the probable position of the majority of face cases at the beginning of labour, rotation of the chin forwards occurring as the head descends.

But the cases to which we refer are when this rotation fails, and when the face descends into the cavity in its original position with reference to the pelvis. Two methods of treatment have here been suggested, and have apparently been practised with success; these being application of extracting force over the occiput, so as to convert it into an ordinary cranial position, and rotation by the forceps, so as to convert it into a mento-anterior position. Smellie, Cazeaux, and others have succeeded by the first method, but that which seems most practicable, at least from a theoretical point of view, is rotation, a manœuvre which, for obvious reasons, can only be practised with the straight forceps. By the latter means, rectification has in many instances been effected, so as to ensure a favourable termination of the labour; and it would be proper, in every such case, to make the attempt; but, if we fail, and the symptoms indicate approaching exhaustion, or are otherwise such as are held to imply a necessity for speedy delivery, we may have no resource remaining but craniotomy. If, in a deformed pelvis, the face presents at the brim, turning is better than the long

forceps in most cases; and if the chin is backwards, there can be no doubt about it.

Forceps in Pelvic Presentation.—In all cases of pelvic presentation, and in the last stage of delivery by podalic version, we have the forceps ready, lest any difficulty should arise in regard to the extraction of the head by the ordinary process. The chin, in such cases, being almost always turned backwards towards the perineum, the blades are passed in front of the sternum of the child, over the chin and sides of the head. The body of the child is then to be carried upwards, towards the abdomen of the mother, by an assistant, when, if the handles of the forceps are made to follow it in the same direction, combining the movement with a moderate amount of traction, the head will usually be extracted without difficulty. This is an operation in which delivery must often be effected with greater precipitancy than usual—as, for example, when twitching of the limbs shows that asphyxia is impending. There are other comparatively rare instances, in which the operation is not effected with such ease. We may encounter cases, for example, in which, the trunk being born, the face has not rotated backwards. These are the instances in which Madame Lachapelle advises us to rotate the face by the finger before extracting it; but, if this cannot easily be done, it will be better to adopt the plan suggested by Velpeau, and endeavour to drag down the occiput beyond the edge of the perineum, and deliver the head by a movement of extension, instead of, as is usual, by the ordinary one of flexion. There are cases, also, in which the head, after turning or in breech presentation, is arrested at the brim in consequence of deformity, when it might be possible to deliver by applying the forceps along the sides of the pelvis; and there are instances, rarer still, in which the head is separated,

Fig. 176.

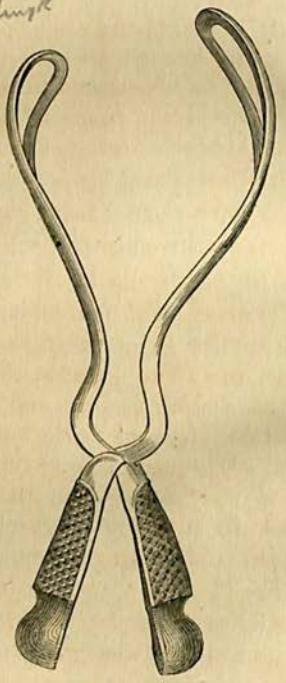


Ziegler's Forceps.

and left behind in the cavity of the uterus, where we must attempt extraction by the forceps, so adjusting the blades as to prevent the possibility of the occipito-mental diameter being thrown across the pelvis.

Varieties of Forceps.—The difficulties which, under special circumstances, attend the introduction of the forceps have given rise to innumerable modifications of the instrument, none of them (with a few exceptions, such as the forceps of Mondotte, in which the blades do not cross) affecting the general principles upon which the

Fig. 177.



Radford's Forceps.

Fig. 178.

Assalini's Forceps.

instrument is constructed. To one or two only of the more important of these, we may call attention. Dr. Ziegler of Edinburgh has recommended a Forceps (Fig. 176) of which the blades are straight, but dissimilar. The fenestra of one blade is carried down to the handle, and in introducing the instrument, the elongated fenestra is slipped over the handle of the other blade, which has been previously passed, and which serves, therefore, as a guide for the adjustment of the other. What is described in the Obstetrical Society's Catalogue as Mr. Philip

Harper's forceps seems, both in principle and in construction, to be identical with Dr. Ziegler's.

Dr. Radford, again, has invented an instrument (Fig. 177), of which the blades are of unequal length, and in which there is a reversed position of the lock. This ranks as a long straight forceps, and is designed by the inventor for application to the head when it is arrested at the brim, the long blade being passed over the face, and the short one over the occiput. The opening formed by the curve in the shank of each blade is for the purpose of passing a handkerchief through, and will enable the practitioner, in addition to his hold of the handles, to use very powerful and effective extracting force.

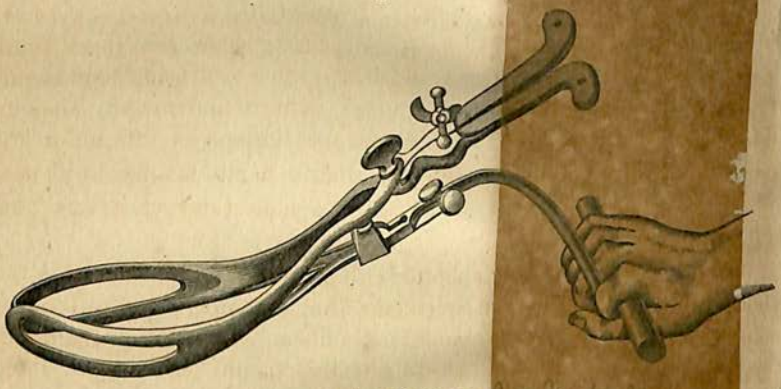
Although the English lock is justly looked upon as one of the most important points in the construction of the forceps, there is no doubt that a most efficient instrument may also be constructed in which the lock is at the end of the instrument. This is the case in Mondotte's forceps already mentioned; and also in Assalini's forceps (Fig. 178), in which the hand grasping the centre of the instrument keeps up a steady pressure, proportionate to the amount of force which is being employed, and over which the operator has a most sensitive and efficient control. Some, even in England, prefer it to our ordinary instruments. To these we might add numerous varieties, which exhibit infinite peculiarities, and which differ from the familiar standards in the nature of the curves, pelvic or cranial, the length of the fenestræ, the width of the blades, and the arrangement of the shanks, handles, and locks.

Some operators have devoted considerable attention to the adaptation of mechanical aids to traction, and very elaborate apparatus has been devised by which, through the aid of pulleys, powerful and steady traction may be brought to bear, while, by means of a dynamometer, the amount of force is carefully gauged so that danger from violence may be averted.

Axis-Traction Forceps: Tarnier's.—But the modification of the instrument which, of late years, has attracted the greatest amount of attention is the adaptation of the principle of axis-traction combined, for the most part, with a perineal curve, so that the power may be as directly as possible opposed to the resistance, and the extracting force be thus employed to the greatest advantage. Hermann of Berne was one of the earliest to adopt this principle, while the early adaptation of the perineal curve is associated more especially with the name of Morales; but the modern idea owes its full development more to Tarnier than to any one else, and so indefatigable was he in working out his idea that he is said to have designed between 1877 and 1879 no less than thirty different modifications of the axis-traction instrument.

The forceps of Moralès consisted simply in a perineal curve which brought the handles backwards over the perineum. Tarnier in his earlier forceps also adopted the perineal curve, but the novelty which he introduced consisted in supplementary or additional handles, which were attached by a movable stem to the outer extremities of the fenestræ. The fixed handles he terms the handles of prehension, and the movable or posterior ones the handles of traction: both were adapted to the perineal curve. His more recent instruments, however, differ in this, that the handles of prehension have no longer a perineal curve, and the general appearance of the instrument (Fig. 179) is that of an ordinary

Fig. 179.



Tarnier's Forceps.

forceps with the addition of the extracting handles, which alone have a perineal curve. These again are furnished with a universal joint close to the transverse bar. When the blades are introduced and the traction handles adjusted—the head being at the brim—the operator pulls steadily, as nearly as he can judge, in the axis of the brim. As the head descends, the fixed handles rise towards the pubes, forming thus an indicator of the advance which is being made, while the universal joint permits of a perfectly natural process of rotation, so that the head automatically follows the normal axis, and obeys the natural law at every stage. The more enthusiastic supporters of this forceps claim for it an immense advantage mechanically, and also greater safety for the patient. Countless modifications of Tarnier's instrument have been devised, but Pajot and many others doubt its general efficiency, and it is certainly open to this objection that its complicated structure renders it very unlikely that it will ever come into general use. It may perhaps be a boon to an ignorant or unskilful operator, but it is more than doubtful

whether it will ever replace, in capable hands, the simpler and more familiar instrument.

In expressing a preference for the straight over the double-curved forceps, in all ordinary cases, we must not be supposed dogmatically to condemn the latter instrument in what are generally called short forceps operations, or, indeed, in any other, save those in which we use the forceps for the purpose of effecting rotation. The authority of those who have pronounced more or less emphatically in its favour is of too great weight to be overlooked. We are inclined, more particularly, to admit the force of Simpson's observation, that it is well for the operator to accustom himself to the use of one kind of instrument only, as a strong argument in favour of the pelvic curve; but, on the other hand, we entertain personally a strong conviction that the straight forceps, while it can effect, below the upper third of the pelvic cavity, everything which the other can achieve, is essentially easier of application by beginners, as it is undoubtedly simpler in construction than its rival. When once its special difficulties are overcome, we cannot doubt, however, that in hands familiar to its use, the double-curved forceps fulfils all the indications of a safe and efficient extractor.

We would conclude this chapter with a single word of caution to the young practitioner who has overcome the preliminary difficulties, and who has attained a certain amount of confidence and skill in the use of the instrument. It is to beware lest this should lead him to a too frequent and unnecessary application of it. Above all, let him remember that no mere question of time, or of his own convenience, can ever be a sufficient warrant for operative interference. No operation is without risk, and nothing, therefore, short of a conscientious conviction that he is about to act in the interests of the mother or the child, can ever absolve him from the responsibility which attaches to him in virtue of the position which he occupies. But, on the other hand, he must no less carefully avoid the error of excessive timidity, which may deter him from assisting his patient in many a case where prolonged and needless suffering means increase in danger to her and to her child.

CHAPTER XXX.

THE VECTIS; FILLET; BLUNT HOOK, &c.: DECAPITATION.

Discovery of the VECTIS *by Roonhuysen: Mode of Using it: Cases to which it may be Applied.—The* FILLET; *a Contrivance of Ancient Origin: Applicable chiefly to Breech Cases.—The* BLUNT HOOK.—*The* CROTCHET: *Precautions necessary in the Use of the Crotchet: The Guarded Crotchet.*—DECAPITATION: *Various Instruments for: Description of the Operation: Extraction of the Trunk: Subsequent Extraction of the Head by the Various Methods of the Forceps, Crotchet, or Cephalotribe.*

The Vectis.—About the same time that the discovery of the Chamberlens was gradually brought to light and introduced into practice in this country, the Vectis or Lever was being used for the delivery of women in Holland by Roonhuysen. The frequent sacrifice of infant life—which was rendered necessary in cases of difficult or obstructed labour—was no doubt the cause which, in both cases, turned the attention of the inventors to the subject, with the earnest desire to devise any means whereby the crotchet and perforator might be superseded by some contrivance which would deliver the woman without destroying her child. The discovery of Roonhuysen, although of much less importance than that of Chamberlen, was an inestimable advantage in practice; and, by the rude instrument contrived by the Dutch accoucheur, many successful operations were performed by himself, his son, Ruysch, and by some others to whom the secret had been communicated. This original lever was of the simplest possible construction, and consisted of a flat piece of iron, bent at each end into a slight curve, and covered with soft leather to protect the parts. The secret of the lever was eventually purchased from those to whom it had been handed down after Roonhuysen's death, by two Dutch physicians, Visscher and Van den Poll, whose names are more worthy of being recorded than those of the inventors, as they jointly paid the

sum of 5,000 livres in order that they might impart to the world a secret which should never have been withheld. As the knowledge spread, the simple contrivance of the originators became altered and modified, until it resulted in the vectis of the present day.

One is apt to suppose that, as the vectis is now seldom used, it has been discarded as a worthless instrument. So far, however, from this being the case, the vectis must always be looked upon as an extractor of considerable power and efficiency, and the sole reason for the neglect into which it has now fallen, is simply because it has been utterly thrown into the shade by the forceps. There are, moreover, even in the present day, practitioners of great experience who occasionally use the vectis in certain cases in preference to the more familiar instrument. The modern vectis has, in its general appearance, a certain resemblance to a single blade of the forceps, and, like the latter, varies greatly in its shape, handle, and fenestra, but more particularly in the curve which is given to it with a view to efficient adaptation to the head of the child. The variety which is here represented is one of the best known of the numerous modifications of Roonhuysen's lever. It is sometimes furnished with a hinge between the handle and the blade —a principle which has also been applied by some to the forceps, with the view of facilitating the introduction of the upper blade. Such an arrangement is, however, quite unnecessary, if the woman is placed in the proper position on her left side, and her hips are brought quite over the edge of the bed, when it may be introduced without difficulty with reference to any position of the head, or any part of the circumference of the pelvic wall.

Fig. 180.

The Vectis.

If we had not at our command a safer and more perfect agent in the forceps, there can be no doubt that the vectis would be an instrument of every-day use for the extraction of the child, whether employed as a lever or a tractor. These two ideas have, manifestly, been the guiding principles upon which suggestions as to the modification of the instrument have been based; when the idea of leverage has predominated, the curve has been slight; whereas, when traction has been the object, the curve has been greater, so as to secure, for this purpose, a firmer hold of the head. No efficient action of the vectis can, however, be produced, unless the principle of a simple lever is more or less brought into play; for, even if we admit it as possible that it may act as a tractor, it can obviously act only upon the end of a cranial diameter, which latter becomes a

lever, the fulcrum of which is at the other pole of the diameter thus acted upon. But its efficient action is scarcely compatible with this idea, as it will generally be found necessary so to use it as to make the blade itself a lever, the fulcrum of which must be found in some part of the pelvic wall. This, in fact, is the great objection to the vectis, when we compare it with the forceps, where the fulcrum of each blade is the lock. It may no doubt be possible, in the case of the single lever, to protect the soft parts by interposing a finger where the force is brought to bear upon the fulcrum, and we may be sure that this is the manner in which Roonhuysen and his followers operated; but still, even under the most favourable circumstances, the danger which arises from such a plan of action must be viewed as considerable, and in direct proportion to the mechanical force employed.

When the vectis is used with the view of facilitating delivery in cases of cranial presentation, it is essential, in the first place, that the position of the head be accurately ascertained; and, further, that the operation should be conducted with a perfect knowledge and appreciation of the laws upon which the natural phenomena of parturition depend, the object being chiefly, therefore, to bring the occiput forwards under the arch of the pubes. If we should thus succeed, by pulling down the occiput, in increasing the occipito-frontal obliquity of the head, it is clear that we are, at the same time, closely imitating the process by which nature manages the descent of the head. This may, if the uterus is acting efficiently, be all that is required; and, in any case, it advances matters a stage. But, in cases of unusual difficulty or absolute inertia, little ultimate good will result if we stop short at this stage of the operation, so that we can only act effectively by bringing our force to bear against the two ends alternately of the occipito-frontal diameter. So soon, therefore, as we have succeeded in causing the occiput to advance, the vectis is to be withdrawn and adjusted to the frontal pole; and by thus acting, now on the occiput and again on the forehead, we may cause the head to advance in the direction of the outlet. A blade which is sharply curved will, no doubt, take a firmer hold of the part to which it is applied, but this advantage is probably more than counterbalanced by an increased difficulty in its introduction. It is for this reason that a more gentle or wider curve has been generally preferred, which, while permitting of easier introduction, makes it more necessary that the blade itself should be used as a lever; and, indeed, some have gone so far as to say that no vectis can possibly be better than a single blade of the straight forceps.

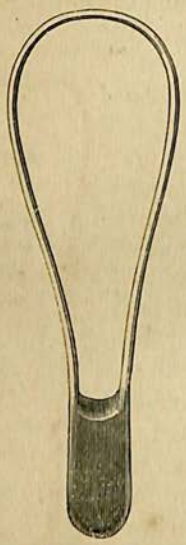
It would appear that the cases in which the modern accoucheur may with advantage have recourse to the vectis, are those in which

his primary object is to act upon the occipito-frontal diameter of the head. Should it seem, therefore, that all that is necessary is to ensure the descent of the occiput, it is possible that delivery may thus be effected with even more safety than by the forceps where the action bears upon the poles of the transverse diameter. Contingencies may also arise, in the course of many operations in midwifery, in which the operator might avail himself of the vectis if it were at hand; but it is probable that in no instance is the vectis more applicable than when we wish to correct malposition of the vertex. The natural process by which occipito-posterior positions of the vertex terminate by rotation, has already been fully described, and it has also been observed that an essential condition to such rotation is the descent of the occiput along the posterior pelvic wall, while the forehead remains high in the direction of that cotyloid cavity to which it is turned. In proportion, therefore, as the forehead descends (*fronto-cotyloid* position of West) along the anterior wall, the more do we despair of natural rotation, and look with apprehension to the probability of a tedious labour or a birth with the forehead to the pubes. Much may, as we have shown, be done by the fingers of the operator directed against the frontal end of the occipito-frontal diameter, and indeed, while propulsive effort exists, nothing is so likely as this to encourage descent of the occiput. But when this procedure fails, we have in the vectis a powerful auxiliary, which we may pass over the occiput; and, thus, by pulling the occiput down and pressing the forehead up, we act simultaneously upon the two poles of the long diameter, in restoring or maintaining that position of the head in which alone nature effects rotation. We may even conceive it possible, that, by a similar mode of procedure, we might convert by this instrument a face presentation into one of the vertex, by producing a rotation of the head on its transverse axis. We may assume, however, as a matter of fact, that, with rare exceptions, the vectis, although a powerful instrument, is completely superseded by the forceps—by which can be effected more speedily and more safely, almost all that the vectis can accomplish.

The Fillet.—This is probably the most ancient of all the instruments used in obstetrics with the view of extracting a living child. In its simplest form, it is nothing more than a loop or noose, which may be variously adjusted so as to facilitate the delivery of the child. It has been constructed, according to Ramsbotham, "of a strip of strong cloth, silk, or leather, formed into a running noose, and was sometimes sewn up like an eel-skin, open at both ends, to admit the introduction of a piece of whalebone, cane, or wire, throughout its entire length, by which its application might be facilitated. It was intended to be intro-

duced over the head in whatever way was most easily accomplished; and, this done, the cane was to be withdrawn, the loop tightened, and extraction was to be effected by main force." Such an instrument is, in as far as cranial presentations are concerned, so manifestly inferior to the forceps, that we can scarcely wonder that it has so completely fallen into disuse as not even to be mentioned in many of the best works on obstetrics. Some modern authorities have, however, to some extent, approved of the principle upon which it is constructed, and have directed their ingenuity to the manufacture of a more perfect instrument, of which the "whalebone fillet" (Fig. 181) is the most familiar illustration. Its length is about ten inches, the loop being seven inches and a half, and its extreme width three inches and a half. In its application, the loop is to be passed over the occiput, and steady traction exercised, when, if this is not sufficient, it may be adjusted over the forehead or chin, thus alternating the extracting force between the frontal and occipital poles of the long diameter of the head, in a manner somewhat similar to what is practised in the case of the vectis.

Fig. 181.



Whalebone Fillet.

The fillet may still be usefully employed in the management of breech presentations, when delivery is arrested either by inertia or disproportion of the parts. Some have, under such circumstances, insisted that the forceps may be used; but the experience of the great majority of practitioners has shown that we cannot depend upon that instrument, which is essentially constructed for application to the cranium. A most efficient means of extraction is, no doubt, afforded here by the blunt hook, but the objection to that instrument, as has already been stated, is the injury which may, by its use, be inflicted upon the groin and genital organs of the child. The fillet may, however, be substituted, and employed both with safety and efficiency. A simple loop or noose, as was the nature of the original fillet, is, in such instances, to be passed over the flexure of the thighs, by means of the fingers, an elastic catheter, or (as has been suggested) the instrument which was designed by Bellocq for plugging the posterior nares. Nothing serves the purpose better than a simple skein of worsted, one end of which is introduced in this way, and the other extremity then passed through it so as to form a running noose. This noose may, again, be adjusted so as to direct the extracting force in a proper manner; and, as our object

generally will be to pull down that hip which is turned forwards in the pelvis, in advance of the other, the noose should therefore be placed nearly over the anterior ischial tuberosity.

The Blunt Hook, which is here shown (Fig. 182), is also an instrument of ancient date. It has been recommended in cases of obstructed breech delivery; but the danger of wounding the soft parts of the child which it entails is now very properly held to be such a serious objection to its use, that it has been entirely discarded in cases where there remains a possibility of the child being alive. In all cases in which the child is ascertained to be dead, the blunt hook may be used without hesitation; and, in these cases, it is a powerful auxiliary to many of the more important operations of midwifery. It is, however, less an instrument adapted to any special operation, or operations, than one which may be useful in a hundred different ways, while we are attempting to extract the child in cases of unusual difficulty. It acts most powerfully when hooked into the flexure of a joint. In this way, as we have seen, powerful extracting force may be brought to bear, when the breech presents, by passing it over the groin; and, in like manner, in cephalic presentations, the shoulder may be made to advance by tractile effort of a similar kind brought to bear upon the axilla. But while these are, perhaps, the circumstances under which the blunt hook is most frequently and usefully employed, it gives no idea of the real scope of the instrument. This, indeed, embraces points in the detail of many of the chief operations of midwifery; and, in the forcible extraction of the child, after the performance of craniotomy, or embryulcia, the hook is almost indispensable. Its advantage, as compared with the crotchet is, that, as there is no necessary laceration attendant upon its employment, it is not absolutely unsuitable for the delivery of a living child; and, besides that, being blunt, there is not, should it chance to slip, the same risk to the maternal parts.

Fig. 182.

The Blunt Hook.

The Crotchet (Fig. 183) was described by Hippocrates, more fully by Ætius, and is alluded to, more or less distinctly, by all the ancient writers on midwifery. It is, like the instrument just described, a hook; but it differs essentially in this, that it is always sharpened, so as to pierce the tissues and thus secure a better hold. In its nature, then, the crotchet is an appliance which can never be used when we have any hope, however remote, of saving the life of the child. The

introduction and fixing of the instrument is a matter of little or no difficulty, nor is it attended with any danger to speak of, as the sharpened portion, being the point of the hook, is turned downwards. But, so soon as the direction is reversed, and we attempt extraction, the crotchet becomes, in careless and inexperienced hands, a highly dangerous implement. In all cases, therefore, in which a sufficient hold can be had, we will, as a matter of course, prefer the blunt hook; but, when it is necessary to act upon flat surfaces, the blunt hook is worthless, and we are obliged to have recourse to an instrument which may penetrate, and thus be fixed upon any surface to which it is applied. The nature of the crotchet renders, however, the maintenance of its grip upon soft tissues extremely precarious, and any violent effort at extraction can scarcely fail to cause extensive laceration, which, in its turn, permits of the sudden detachment of the instrument from the point at which it has been fixed to the fœtal tissues, and possible laceration of the maternal parts.

Fig. 183.

The Crotchet.

Every practical accoucheur knows that no confidence whatever can be placed in the instrument as a tractor, unless we can fix it in some unyielding part of the bony structures, upon which alone we can safely bring anything like efficient effort to bear. But even this is far from safe, for, under the influence of powerful effort, the crotchet may at any moment, even when it is apparently well fixed, break suddenly from its attachment. This is, in fact, the special danger of the crotchet and the great objection to its use, as by such an accident the maternal structures may, in a moment, be seriously, or even fatally injured. It is on this account that no sound practitioner will ever use it without taking great pains to guard against the result which may possibly ensue; and he therefore invariably uses the finger of one hand as a guard, so that if it should slip, the maternal parts are efficiently protected. An instrument called the "guarded" cotchet, in which a spoon-shaped blade is substituted for the fingers, as a guard, is, as we shall find (see Fig. 191), occasionally used at a certain stage of the operation of craniotomy.

While we thus admit the full force of the objections which exist to the use of the crotchet, it must be confessed that, in cases of great difficulty, it is a valuable, and almost indispensable aid. The point of greatest importance is to secure for it a firm and unyielding attachment, so that it is usual to try to fix it in the orbit or mouth, or elsewhere in the same region, so as to maintain an efficient hold upon the

irregular bones of the face; and, in those instances in which it is passed within the cranium, or any of the other hollow cavities of the body, the same principle guides our action, so that we may find ourselves at one time fixing it in the foramen magnum, and at another attaching it to the spinal column, or the pelvic brim.

The nature of the crotchet is such that it can operate upon one point only of the circumference of the head, or other presenting part. If we act, therefore, in a cranial presentation, in this manner upon the orbit, we run the risk of dragging down the forehead by a movement of the head on its transverse axis, without securing any actual advantage, and with the possibility, if the chin be backwards, of making matters worse. Ætius, in one of the most interesting passages of his obstetric works, recommends that we should operate by two crotchets, applied at the sides of the pelvis, to opposite surfaces of the child's head, and then pull downwards, in order that the traction may be equal, and in the direction of the resultant of the two forces (*ad neutram partem declinans*). Had he but thought of the possibility of applying the same principle to the delivery of the living child, he would almost inevitably have discovered the forceps. But, as in the case of Hippocrates and the olive, such speculations are perhaps more interesting than instructive. The hint here given, as to the combined action of two crotchets, is not to be despised, as there are certainly cases in practice in which the principle indicated might usefully be adopted; and this, in fact, was recommended and practised by Dr. Davis.) In so far as cranial presentations are concerned in which the forceps fails, or in which the use of that instrument is contra-indicated, no good can possibly result, except under peculiar or exceptional circumstances, from the use of the crotchet, until we have already diminished the head by perforation of the cranium, and extraction of its contents.

Decapitation.—An instrument closely resembling, in shape and general appearance, the blunt hook, but which has a cutting edge within the curve, has been used with success in the treatment of those difficult cases of transverse presentation in which the ordinary methods of treatment have failed. This operation simply consists in abridging the long diameter of the child by a section made at the neck. It is described by Celsus, and by many writers subsequently; but, with the exception of Davis, Ramsbotham, and more recently, Barnes, the subject has not received that attention in this country which it seems obviously to merit. It appears to us advisable, therefore, that we should in this place describe the operation somewhat in detail. This mode of procedure is chiefly applicable to those instances in which we have to deal, either with a neglected case of shoulder presentation, where the body

of the child is partly impacted, or is so tightly embraced by the uterus as to render turning impracticable, or with a case in which the difficulty arises mainly from pelvic distortion, complicated with a transverse position of the child.

The form of hook already described is that which is best known in this country under the name of Ramsbotham's hook, but a number of other instruments, more or less resembling this, as well as some of a different construction, have been recommended. Among the latter may be mentioned a contrivance of the nature of a chain saw, which is to be passed round the neck, and then, by a saw motion, is carried to and fro by means of cross handles at its extremities, until the head is severed. It is certain that the wire-rope écraseur might be advantageously used for the same purpose, but the difficulty in such cases is to pass the rope or single wire around the neck. It would appear that, with the ordinary instrument, a cutting surface is by no means absolutely essential, as some have succeeded by means of the ordinary blunt hook. The operation of decapitation consists of three stages. The first stage is the application of the decapitator and the bisection of the neck; the second is the extraction of the trunk; the third, the extraction of the head.

The first point to be accurately ascertained is the position of the body of the child, whether dorso-anterior or dorso-posterior. This being determined, in the manner already described, by an observation of the hand of the fœtus, and the woman having been placed in the ordinary obstetric position, or on her back, the arm of the child is to be firmly pulled downwards, so as to bring the neck, as far as is practicable, within the reach of the operator. The arm is then to be intrusted to an assistant, whose duty it is to maintain the position by steady and moderate traction. The bladder—and, if it be necessary, the rectum—are now to be emptied of their contents, and the hands and hook smeared with lard or oil. The fingers of one hand—right or left, according to the position—are then gradually insinuated in a direction corresponding to the anterior surface of the child, so as to reach the front of the neck. With the other hand the operator then introduces the hook, "laying flat," says Barnes, "between the wall of the vagina and pelvis and the child's back, until the beak has advanced far enough to be turned over the neck. The beak will be received, guided, and adjusted by the fingers of the left (opposite) hand. The instrument being *in situ*, whilst cutting or breaking through the neck, it is still desirable to keep up traction on the prolapsed arm. In using Ramsbotham's hook, a sawing motion must be executed, carefully regulating your action by aid of the fingers applied to the beak. If Braun's

decollator be used, the movement employed is rotatory, from right to left, and at the same time, of course, tractile. The instrument crushes or breaks through the vertebræ. When the vertebræ are cut through, some shreds of soft parts may remain. These may be divided by scissors, or be left to be torn in the second stage of the operation—the extraction of the trunk."

The delivery of the trunk and limbs of the child is now to be effected, mainly by pulling upon the arm; but, should the force requisite be considerable, it will be proper to pass the blunt hook into the axilla of the opposite side, in order to economize the tractile force on the depending arm. Care must, however, be taken not to use the hook with too great force, as, by causing the premature descent of the upper shoulder, we would throw the great diameter of the shoulders across the pelvis, and thus, it may be, render the extraction of the trunk a matter of increased difficulty. Generally speaking, no great difficulty, in the absence of pelvic deformity, will be encountered in this stage of the operation; and steady traction will cause the shoulders, trunk, and breech, successively to pass along the pelvic canal. The head, if completely separated, will move to the side, and will be no obstacle to the passage of the body.

Removal of the Head.—The extraction of the head of the child, which constitutes the third stage of the procedure, is by no means an easy operation, and is sometimes, in fact, the most difficult point of all. A good deal will depend upon the condition of the uterus as regards contraction. During the second stage, it will be the duty of an assistant to keep up steady pressure upon the fundus of the uterus, and to follow it downwards as the trunk is being gradually expelled, so as to encourage, as far as may be possible, efficient and symmetrical uterine contraction, under the influence of which the head will be grasped, forced down in the direction of the cavity, and maintained in a comparatively fixed position. Another condition likely to exercise an important influence is the state of the head itself, which, if decomposition has advanced, will be easily compressible, the flat bones being so loosely connected with each other as to admit of overlapping to a very unusual extent. Various methods have been suggested and practised for the extraction of the head from the uterus. The instances in which it is expelled by the natural efforts are few, and no confidence can, for obvious reasons, be placed in the occurrence of such a result. In some cases, it has been successfully removed, when compressible from putrefaction, by the fingers of the operator; but, in almost all ordinary cases, instrumental aid is required, when we have the forceps, the blunt hook, the crotchet, and the cephalotribe to select from.

The great obstacle, in such cases, arises from the mobility of the head, which rolls about within the cavity, and can sometimes only be seized with difficulty. If, however, the head can be steadied and pressed downwards by the assistant, whose hands are employed for this purpose in the hypogastric region, the difficulty in question may be overcome. If it be possible to fix the crotchet, or a small blunt hook, in the foramen magnum or orbit, success may, in this way, with the aid of the fingers, be quite practicable; but the risk of the crotchet slipping is so considerable, that the more experienced modern operators have pretty much discarded that instrument in favour of the others which have been mentioned. The safest and most satisfactory operation, when it is practicable, is that by the ordinary midwifery forceps. The difficulty in this, as in the other operation, is to fix the head; for, as soon as one blade is introduced, the head may escape to the upper part of a relaxed uterus, or to either side, so as completely to elude the grasp of the blades; but if we can succeed in seizing the head, either antero-posteriorly or latterly, delivery will usually be completed without any further obstruction. The only other point to which it is necessary to pay particular attention, is the adjustment of the blades in such a manner as may obviate the possible danger arising from jagged spicula, which may project from the several vertebræ, or from such splintering elsewhere as may possibly have been the result of previous operative efforts.

There are cases, however, in which much more serious difficulties attend the extraction of the retained head. The worst examples of this are instances in which there is pelvic deformity, and in which it may be quite impossible for the ordinary diameters of the head to pass. In these, and in the more difficult of the cases unconnected with pelvic distortion, it has been suggested that the perforator should be used. It is to be feared, however, that, even in the hands of the most skilful, great risk will attend the use of that instrument; and, even if it were not so, it must be admitted that the operation is one which we would not, without great apprehension, intrust to the inexperienced. Hazardous as the perforator always is, it is in this instance peculiarly so, owing to the mobility of the head, in consequence of which it may rotate suddenly and unexpectedly at the moment of perforation, and thus direct the sharp point of the instrument against the uterine wall, with possible results too fearful to contemplate. If we are able, by means of external manipulation, to fix the head against the brim, the perforator may be successfully employed against the occiput; but, as mere pushing force would most likely dislodge the head, it is proper to combine boring with the more violent effort, which will certainly, in

economizing the latter, conduce to the safety of the operation generally. After perforation, and evacuation of the contents of the cranium by a process exactly similar to that which will be described under the head of Craniotomy, the extraction of the head by the guarded crotchet, or still better, by the craniotomy forceps, will be a matter of no great difficulty; but, in both cases, the greatest possible care should be taken, as the head descends, to preserve the soft parts from laceration by the splintered fragments of the bones. The Cephalotribe is an instrument which, in the management of such cases, is both safer and surer than either the perforator or the crotchet, and almost as simple as the forceps in its application and management, as will be hereafter explained. And, after discharging its special office of crushing the head, which is of such importance in contraction of the brim, the cephalotribe may further be employed as an extractor.

But it is not as a sequel to the operation of decapitation alone that extraction of the head has to be effected, seeing that it is occasionally required under other circumstances, such as its accidental separation after the operation of turning. This is not likely to occur in experienced hands, but the separation of the neck of a putrid child does not require much force, and might happen to any one. Far less excusable are the cases in which, in a breech presentation, or after turning, the head is arrested at the brim, and such violence is used in attempts at extraction as to result in tearing the trunk away from the head. In the absence of evidence of the death of the child, it is scarcely to be conceived that any one would use such violence as would of itself sacrifice the life of the child. But, if the child be dead, the operator might imagine that this is the safest and most natural method of delivery, and act accordingly by employing an amount of force which, in the interests of the mother, is quite unjustifiable, even should he succeed in his endeavour, seeing that he has, in the forceps and the perforator, agents by which maternal risk is materially reduced.

Read also pages 618. 19. 20.
Van Huevels [illegible]
Wire Ecraseur

CHAPTER XXXI.

TURNING.

Various Methods of Turning: Turning as practised by the Ancients.—Podalic Version.—Circumstances which call for, and Conditions favourable to, the Operation.—The Operation in Detail: Choice of Hand; Introduction of the Hand; Passage of the Os: Seizure of a Foot or Knee; Circumstances which render Turning Difficult; Difficulty in Seizing the Foot.—Child to be Turned Forwards.—Management of the Case after Version.—Pelvic Version.—Cephalic Version.—Turning in Contracted Pelvis: Degree of Distortion which may admit of Turning.—Turning contrasted with the Long Forceps, and as a Substitute for Craniotomy.—Special Difficulties.—Bi-manual or Bi-polar Version.

THE operation of Turning, in its most extended sense, implies a manœuvre by which one of the poles of the long diameter of the child, which has not originally been the presenting part, is brought into the brim of the pelvis, the long diameter of the fœtal oval being made, in every case, to correspond with the long diameter of the uterus. Two varieties of turning may therefore be practised: these are turning by the head, or, as it is generally termed, Cephalic Version; and turning by the feet, or Podalic Version. A special modification of the latter, in which the breech, and not the feet, is brought down, has been occasionally practised, and separately described.

Practice of the Ancients.—From the time of Hippocrates down to the middle of the sixteenth century, Cephalic Version was almost exclusively practised, the head of the child being assumed to be the only natural presentation. This assumption led to the frightful practice of turning by the head in all presentations of the pelvic extremity. It is quite clear that both Aristotle and Celsus held more correct views; but the practice of Hippocrates, nevertheless, held its ground until the period which we have mentioned, so that, up to that time, the ordinary

operation of podalic version, as practised in the present day, was quite unknown. In 1561, Pierre Franco, in a work devoted chiefly to Surgery, suggested the mode of turning by the feet, and this was subsequently adopted by Paré, Guillemeau, Mauriceau, Baudelocque, and Lachapelle, to the complete exclusion of the cephalic operation. The difficulties which, under certain circumstances, surround the modern operation, seem, as late as the end of last century, to have suggested doubts as to its propriety in the minds of Flamand, Osiander, and other distinguished accoucheurs of that time, who therefore suggested that the practice of Hippocrates should be resorted to in all but original presentations of the breech or feet, to the exclusion, absolutely, of the new method. These views found favour chiefly in Germany, but the podalic method made steady progress, and came ultimately to be generally adopted. The contemptuous manner, however, in which cephalic version was passed over or condemned by many of the most eminent writers of this later period, led for a time to the complete abandonment of this process in favour of podalic version; but, in the present day, its value finds general recognition in a certain class of cases, limited, no doubt, in point of numbers, as will be more particularly shown in the sequel.

Podalic Version.—What is now, however, universally described as, *par excellence*, the operation of Turning, is Podalic Version, which consists in bringing down one or both feet when another part presents, and thus converting it into a footling presentation. The circumstances which call for this operation embrace a large proportion of all cases in which a speedy delivery is required, and especially those in which the necessity has arisen early in the course of labour. Among the circumstances thus alluded to, may be mentioned placenta prævia, prolapse of the cord, sudden death of the mother, certain cases of rupture of the uterus, and, in the opinion of many, cases of moderate pelvic distortion, in which it has been proposed as a substitute for the forceps or the more formidable operation of craniotomy. In transverse or shoulder presentations, again, it is the invariable procedure, and, in so far as this particular case is concerned, it has already been described at some length.

It is of the first importance that the conditions favourable to the operation should be correctly appreciated. As it is usually performed, it is essential that the os and cervix should be sufficiently dilated to permit of the passage of the hand; but, as a moderate degree of dilatation only is requisite for this, it follows that turning is available at a stage of labour considerably earlier than we have seen to be necessary for the safe employment of the forceps. Another favourable condition applic-

able alike to all cases, is, that the membranes should be intact. The reason of this is obvious for, so long as the liquor amnii remains, the walls of the uterus are separated, in proportion to its quantity, from the body of the child, the mobility of which is consequently greater. Nothing, indeed, contributes so much to the ease with which turning is effected as this, but, if the waters have escaped, and the womb has thus been permitted to grasp the body of the child, the operation is then found to stand in a very different category. The condition of the os as regards *dilatability* is another most important consideration, for a rigid or unyielding condition of this part of the passage is justly looked upon as an unfavourable circumstance, and it is therefore proper to wait, so long as the membranes remain unruptured, until nature overcomes this resistance.

The Operation.—The condition of the bladder and rectum having been attended to, the woman is, in the first instance, to be placed in a convenient position. Some operators prefer that she should be on her back, and others that she should be on her elbows and knees; but the English operator will generally choose the ordinary midwifery position on the left side, the nates being brought to the edge of the bed, so as to be within convenient reach. She should then be brought under the influence of chloroform, or some other anæsthetic. This has the effect of facilitating, both directly and indirectly, the passage of the hand, by overcoming rigidity and spasmodic contraction, and obviating the embarrassment which may arise from movements which are the result of apprehension or pain. The uterus is to be supported by an assistant, or by the other hand of the operator. By this means valuable assistance is afforded, by movements which are made in concert so as to bring the lower extremities of the child within reach.

Choice of Hand.—The directions which are often given as to the hand which should be employed are of little practical value. Indeed, it is impossible in some cases, as in placenta prævia, to recognise, before it has been passed into the uterus, the conditions which are held to indicate the use of the right hand or the left. Most people can act much more efficiently with the right than with the left hand, and there is no possible direction within the pelvis in which the right may not be passed. The positions in which there is most difficulty are those in which it may be necessary to direct the hand, with the palm forwards, towards the left sacro-iliac synchondrosis, while the woman lies in the ordinary position on her left side. In this case the hand must be pronated to the fullest extent; and, if this movement of pronation is increased, as it may be by the operator turning his back towards the patient, it will pass without difficulty.

The left hand would undoubtedly serve the same purpose here, if we could be sure of equally efficient action with it after the introduction. If the operator be left-handed, he will naturally use the left hand in preference to the right; and, as our first object is to attain the abdominal surface of the child—which, in the great majority of all positions, lies towards the back of the mother—and as it must clearly be easier to pass the left hand along the sacrum than the right, the left-handed operator has a certain advantage. For the same reason, he who is ambidextrous should use that hand which may best suit the position of the child; but, if the position be doubtful, he should invariably select the left, as being more likely to lead to the anterior surface of the child's body, while at the same time the flexion of the fingers will correspond to the axis of the pelvis.

The operator should take off his coat and bare his arm, so as to obviate, as far as is practicable, any inconvenience which may arise from pressure upon the muscles. The hand and arm are then to be liberally smeared with lard, and the points of the fingers, which are brought together like a cone, are introduced within the vulva, and steadily pushed upwards in the axis of the outlet. In the event of unusual contraction at this stage, the obstacle will, to some extent, be overcome by separating the fingers, so as to stretch the parts. No such difficulty, however, usually exists, but a more important one is encountered as the knuckles approach the orifice of the vagina. This is increased by the action of the constrictor vaginæ muscle, especially in cases in which anæsthetics are not employed; but the resistance, by the stretching action of the fingers, combined with moderate and unremitting pressure, will speedily be overcome, when the rest of the hand will pass into the vagina, the muscles retracting upon it as it advances, and ultimately grasping the wrist. It is at this stage proper to pause, which affords us an opportunity of more carefully examining the presenting part, and, it may be, of ascertaining the direction in which the hand is to be passed, with greater certainty than can be attained by the finger only.

The operator, bearing in mind the curve of the pelvic axis, now alters the direction of his hand, so that its advance may coincide more with the axis of the brim. His subsequent procedure will depend chiefly upon the condition of the os. If it is well dilated, soft, and distensible, the hand may be passed at once, and turning will probably be effected with such ease as may astonish the inexperienced. But, if the os be comparatively undilated, or in any degree rigid, he must proceed more warily, so as to avoid the slightest approach to violence—introducing first one, then two, and subsequently the remaining

fingers, in the most cautious manner possible. It is generally said that, to warrant an attempt at turning, the os must be dilated to the extent of a crown-piece. This is, of course, only intended as an approximation, and as much or more will depend on the dilatability, as upon the stage of actual dilatation.

If the membranes are still unruptured, another object in avoiding abruptness in manipulation is to preserve them intact. With this in view, therefore, we direct the fingers, so soon as they have passed within the os, between the uterine wall and the external envelope of the ovum, and, the connection between those parts being lax, no great difficulty is generally encountered in passing the hand upwards, without rupturing the membranes, in the direction of the feet.

No part of this process is, however, to be attempted, without reference to the natural expulsive efforts. If the uterus is acting in the usual manner by rhythmical contraction, we should choose the period of relaxation for the advance of the hand; but, so soon as the advent of a pain is announced by contraction of the uterine walls, the hand should be allowed to lie quite flat and inactive, with the palm towards the child, until the period of relaxation marks the moment when our efforts may be safely resumed. Any attempt at continuous effort is wrong in principle, and is, we may be sure, apt to cause laceration, and even rupture of the uterus. This rule is one which is not observed in practice so strictly as it ought to be, and the wonder is that accidents are not more frequent than they actually are, in cases where force is employed by the operator with no reference whatever to anything save the resistance which he encounters. It will, however, as must be confessed, often be found that the stereotyped direction to act during an interval, and pause during a pain, cannot well be adopted, for the simple reason that the contact of the hand excites the uterus to continuous, or at best remittent action, so that if we are to wait for absolute inaction on the part of the uterus, we may abandon the effort altogether. Such continuous or spasmodic action as this may be, as we have seen, allayed by anæsthetics; and, if it should persist, we may still succeed, although it is necessary, in such instances, to act with redoubled caution and deliberation.

As soon as the hand has reached so high in the uterus that the inferior extremity of the child can either be felt, or may be assumed to be on the same level, the sac of the liquor amnii may be ruptured, and the fingers passed in the direction of the foot or knee. A too strict observance of this rule is, however, undesirable, for example, when the foot or knee is lower in the uterus than usual, we might then advance

the hand further than is necessary, and, of course, if we come upon the edge of the placenta, the membranes must be pierced at once. The rupture of the membranes is easily effected, by an effort of the fingers or the action of the nails in the direction of the fœtus; but with this the mechanical advantage of the liquor amnii is not lost, as it is still retained by the efficient plug formed by the arm which occupies the os uteri. This renders the actual version an easy matter. The fingers of the operator lay hold of a foot or a knee, which, in withdrawing his hand, he brings with him, choosing, if he can, a moment of uterine rest for the purpose, and availing himself, if it be necessary, of the assistance of the other hand, which is to be applied externally (see Fig. 184). As this is being done, the original presentation retreats from the lower segment of the uterus, so that the turning part of the operation is complete.

Much argument has been wasted as to the propriety of bringing down one leg or two. The sound rule in practice is, that when we succeed in securing one foot or knee, we should not pause to search for the other, unless we have some special object in so doing, as in certain cases of pelvic deformities where we might prefer to seize both, or in transverse presentation where we would prefer the more distant limb. One is all that is necessary, and, in point of fact, the descent of one leg has a positive advantage as compared with two, as thus, by increasing the diameter of the pelvic extremity of the child, the parts are more thoroughly dilated, so as to admit of the ultimate passage of the head rapidly, and with comparative safety. And, as this is the stage at which the life of the child is most frequently compromised, it is assur[illegible] abridging its duration, fœtal life in the aggregate must, by [illegible] be saved. Still, when a very rapid delivery is desired, t[illegible] knows that he has a better and more efficient hold upon [illegible]

Fig. 184.

Podalic Version.

than he can have upon one; and he will, therefore, very naturally, bring down both when they are within easy reach; but, when the discovery and seizure of the other limb involves extra effort or delay, not even in such a case as this should he be otherwise than content with what he has already achieved. The foot or knee which is lowest in the womb or easiest of access should at once be seized; but, in a transverse presentation, there is no doubt that turning will be more easily effected when we seize the leg of the side opposite to the presenting shoulder, so that in those cases, if we have a choice in the matter, we should select the limb which is more distant from our hand.

Constriction of the vaginal orifice, and incomplete dilatation of the os, are, as we have seen, difficulties which are often encountered in attempts at turning. Far more serious than those are the obstacles which we meet with, when the conditions which we have indicated as favourable to the operation do not exist. A case, for example, may be brought under our notice for the first time at an advanced period of labour, in which the os has been permitted to dilate, the membranes to rupture, and the presenting part to descend in the pelvis before the nature of the case has attracted particular attention, or the necessity for turning has been recognised. The most familiar illustrations of this are shoulder presentations, already described. In such cases, the liquor amnii has, we shall suppose, long since escaped, the uterine walls have grasped the child in a firm embrace, and the long-continued uterine action has forced the shoulder down into the cavity of the pelvis. If pelvic distortion should exist, impaction may have taken place; but, independent of this, mere tonic uterine contraction may so wedge the head as to render the case practically as bad as one of real impaction. In such cases, the difficulties are often insurmountable, for the operator cannot even pass his hand beyond the presenting part, and is obliged to desist, or have recourse to some of the other operations of midwifery. It is perfectly impossible to describe—what experience alone can teach—the amount of force which, in this, or any other stage of the operation, we are warranted in employing. Anything even approaching to what we would call violence, is not only improper, but ineffectual, so that moderate and sustained effort, combined with an insinuating movement of the fingers, should always be preferred, as being comparatively both efficient and safe. If, for example, we were rudely and recklessly to [illegible] hand into the vagina without observing the precautions we [illegible]d, we should, in all probability, inflict severe laceration on [illegible] but if, on the contrary, we act with caution and discretion [illegible] precisely similar, we effect our purpose with ease and safety.

The same principle obtains, and should never be lost sight of, in all the subsequent stages.

Impaction implies resistance from the pelvic walls; but we have obstacles of a not less insurmountable kind in the rigid condition of the os or uterine walls, when, although success by violence may be possible, it is only to be effected by what involves serious risk to the mother. It is such considerations, therefore, based on general principles, which should be our guide in practice, and deter or encourage us in an individual case. It not unfrequently happens, as practice has taught every experienced accoucheur, that these successive stages of difficulty have been, one by one, surmounted, and yet, at the very moment when success seemed just within our grasp, further progress was arrested. The tips of the fingers may even touch the knee or foot, and yet the inch or so of further advance which is required can scarcely, by any moderate effort, be achieved. This is a moment at which, in our eagerness, we are very apt to pass the line which separates prudence from rashness. By a vigorous thrust of the arm, we may be confident that we shall attain what we so much desire, and it is with difficulty only that we can refrain from what alone seems wanting to complete success. We must, however, with firmness and what we may term self-denial, resist this inclination, and wait a little until, perchance, we may wear out the uterine resistance which constitutes the barrier to our progress.

It is here, however, most unfortunately, that the straining of the fingers is apt, along with violent uterine contractions, to cause cramp of the muscles of the hand, a condition which may absolutely paralyze our efforts. By resting for a time, or stretching the fingers, the power of the hand may return; but it too often occurs that we find ourselves quite powerless just at the moment when we have come to count upon success crowning our efforts. Nothing will remain for us, in such a case, but the withdrawal of the hand, to our great chagrin, and either the introduction of the other, or the re-introduction of the same one after it has had time to recover. What is particularly annoying, when this is found to be necessary, is that the withdrawal of the hand from the uterus permits of the escape of what liquor amnii remains, and, consequently, of a still greater degree of uterine contraction upon the body of the child. Even in such a case, however, we may ultimately succeed by perseverence, and, when the hand has again been introduced, our external manipulations may result in bringing the feet within reach. But, with this measure of success, our difficulties may be far from being at an end.

Use of the Fillet.—It sometimes happens that the hand is intro-

duced, the foot seized and brought down to the os, and yet complete version cannot be effected. When the presence of the liquor amnii, or a relaxed condition of the uterine walls, permits of a certain degree of freedom of motion, the presenting part will recede as the foot is pulled downwards to the os. But, when the body of the child is firmly grasped by the uterus, this is not the case, and some further manœuvring, external or internal, will be required to complete the operation. The mode of acting externally through the abdominal walls has already been alluded to, and will again be more particularly described. The internal manipulation in these cases consists in pushing up the presenting part while we pull down the foot. In other words, we act upon the two poles of the long diameter of the fœtus instead of one only. The vagina,

Fig. 185.

Turning by the Noose or Fillet.

however, being already fully occupied by the hand of the operator, it is impossible for him to act upon the presenting part without letting go the hold which he has of the foot, but this is of all things what he least wishes to do, as there is often great difficulty in securing it again. By a very simple expedient he is able to effect all that he desires. A running noose of tape or cord is to be passed over the fore-arm, and is then pushed upwards over the hand and beyond the os calcis and instep of the foot. When tightly drawn, this secures an admirable hold, and the hand may be withdrawn, or at once brought to bear upon the head or presenting part, while the other hand pulls steadily upon the noose.

The same principle has been adopted, by Braun and other eminent Continental practitioners, when difficulty arises in seizing the foot, and various instruments have been devised by them with this purpose. One of these is described by Hyernaux of Brussels, under the name of *porte-lacs*. When such combined action upon the two extremities of the child fails, it may be impossible to effect delivery in this way, so that we may have to fall back upon the perforator or decollator, as the case may be. Before finally abandoning the attempt to deliver by this method, we must be sure that we have pulled down the foot in the proper direction, so as to turn the child *forwards*. An error here is not likely, as we would naturally pull the foot, when seized, directly towards the os; and if we have passed the hand along the abdominal surface, we can scarcely go wrong; but it is quite possible that, by omitting this precaution, and passing the hand over the dorsal surface, we may not only find it vastly more difficult—if, indeed, it be possible—to reach the foot, but we may discover, in addition, that when it is reached and seized, turning is impracticable after all.

It is generally recommended by systematic writers, that we should so manage the operation as to make sure that the abdomen of the child is turned, after version, towards the spine of the mother, as is indicated by the toes being directed towards the sacrum. This is, however, by no means a matter of such importance as it might appear, for if, as often happens, the toes should be pointed to the symphysis pubis, the trunk of the child will rotate as it descends, so as to bring the face ultimately into the hollow of the sacrum, whatever the original position may have been. But, when the natural rotation has not taken place, it has been found necessary to assist the movement by manual interference. The greatest caution must, in every case, be exercised, to prevent, as much as may be possible, pressure upon the cord; but, in so far as this is concerned, what has already been said, in regard to presentations which are originally of the pelvic extremity, will serve for our guidance in those cases in which the pelvic end of the fœtal ovum is artificially, and for a particular purpose, brought down. One advantage of effecting version, so as to bring the dorsal surface to the front, will be to bring the cord naturally into the posterior part of the pelvis, from the first, by which we are enabled to place it in that situation in which it is least likely to be subjected to severe pressure.

When version is complete, we have converted the case, whatever it may originally have been, into a presentation of the feet. It remains, however, for consideration, whether we are to leave the case to nature, or to effect immediate delivery. It is almost always proper to pause, for some time, until we see what nature is likely to do; but, if the

symptoms are such as to call for prompt action, whether in the interests of the mother or the child, we must act boldly, and without hesitation, in effecting immediate delivery. It should be remembered that, so long as the head of the child remains above the brim, the cord is not likely to be subjected to any dangerous pressure, so that, while nothing is lost by delay at this stage, something may be gained by pausing until uterine energy is awakened. If the cord has prolapsed, or has otherwise come within reach, at this or a subsequent stage, we will be guided by the presence or absence of pulsation, and the other evidences of vitality of the fœtus, in determining whether to precipitate matters or not. During the descent of the trunk, we must observe the usual precautions, but at the last stage there must be no delay, and the forceps and restoratives should be at hand, so that we may at once have recourse to them should occasion arise, and that in the manner described in the chapter on Pelvic Presentations.

Pelvic Version.—The term Pelvic Version, as employed by English writers, implies an operation in which the breech, and not the feet, is brought to the os when another part originally presents. That this may, in rare instances, be effected by dexterous management, does not admit of dispute; but, at the same time, such a course of procedure is so obviously one of greater difficulty, as compared with podalic version, that we need not wonder that the former operation, which, indeed, never attracted much notice, has been all but entirely superseded by the latter. As regards the ancient operation of Cephalic Version, it seems certain that there are cases of transverse presentation in which we would be justified in making an attempt at what is a less severe operation to the mother, by pushing up the shoulder, and so manipulating as to cause it to be replaced at the os by the head. Success could here only be hoped for when the child is still movable within the uterus, and the methods most likely to be attended with success are either the "bi-polar" method, or Dr. Maxson's postural method, both of which will be afterwards described.

Turning in Pelvic Contraction.—The application of the operation of ordinary or podalic version to cases of pelvic contraction, is a mode of procedure which was practised long before the forceps was discovered. Nor did the discovery of that important instrument throw the earlier operation entirely into the shade; and, indeed, we find Denman and other contemporary writers giving minute directions, a hundred years ago, as to the manner in which the operation is, under such circumstances, to be effected. There can be no doubt, however, that, as practitioners became more skilled in the use of the forceps, and the instrument became more thoroughly understood, the nu[illegible]

contracted pelvis in which turning was practised, was more and more diminished in number, until, at last, the operation fell into complete disuse. The operation was, however, revived and strenuously advocated by Simpson; and, although some experienced operators have condemned it, it is the fact that many of the most distinguished living accoucheurs have adopted his views and practice. Simpson maintained his position by arguments and facts—the former being characterized by the ingenuity and ability which he possessed in such a high degree, and of which his works afford no more striking illustration.

The fact that this operation involves a question of conservative midwifery, is one which may alone suffice to secure for the subject earnest and careful attention, and this, indeed, it has received from almost all recent writers. In cases in which the head is arrested by pelvic contraction at the brim, we have three possible modes of action between which we must decide—turning, forceps, or craniotomy. The two first are conservative, the last destructive. The dangers and difficulties of the long forceps are well known, and have been fully described; but there are, probably, few operators who would not rather risk them than wantonly destroy a living child, as we have too good reason to believe has often been done. The case is quite different when the child is dead; for here we determine upon a plan of action which we undertake solely in the interests of the mother, when craniotomy stands before us under quite another aspect. The first point of importance, then, is to determine whether or not the child is alive; and if, this being established, we fail to deliver by the long forceps, or that instrument is contra-indicated, the question before us simply is:—Shall we turn, or perforate—attempt to save the child, or at once destroy it?

The reply to this question, involving as it does such weighty responsibility, will depend upon a variety of circumstances, of which the most important, perhaps, is the degree of pelvic distortion which actually exists. It is impossible to fix the exact measurement of the conjugate diameter which may be held to warrant an attempt at turning; and, even were it possible to determine this with fractional accuracy, our modes of practising pelvimetry are so uncertain, that it is a matter of the greatest difficulty, even to the most dexterous, to gauge a pelvis during labour. Dr. Churchill fixes the limit at two inches and six eighths, and Dr. Barnes—as we believe, with more justice—at from three and a quarter to three and three quarter inches; so that we may say, in round numbers, that when the conjugate diameter is less than *three inches*, to attempt to turn would be to expose the woman to needless risk, as we may be confident that no live birth failure could attend our efforts.

But, seeing that this is a question where an eighth of an inch may make all the difference between success and failure, and it is impossible to ascertain the exact space with anything more than what is at best an approach to accuracy, it follows, as a possible contingency, that we may actually turn, and subsequently find that we have miscalculated either the conjugate diameter or the size of the head, and that the latter will not pass. Such a failure as this is not so serious a matter as might at first sight appear; for, if we have thus to resort ultimately to craniotomy, that operation will be attended with very little more difficulty and no greater risk than if we had begun by perforating the vertex. The mother, no doubt, has been subjected to the risks of turning in addition to those of craniotomy, but we are surely warranted in incurring this additional risk in the hope, if successful, of saving the child.

It is unnecessary again to refer at any length to the positive advantages which are claimed by Simpson for the operation of turning in contracted pelvis, as these have already been fully described.[1] The bi-parietal measurement of the head is, as he points out, greater than the bi-mastoid; and as, in turning, the latter enters the contracted space first, he argues that, on obvious mechanical principles, the *compressibility* of the head is increased by version; and, as it is well known that in some cases of this kind, when the child has been born alive, the parietal bones have been found to be flattened or indented by the pressure, he concludes that turning under such circumstances is not only a reasonable proposal, but an actual gain in facility of delivery and safety to the child. Simpson's theory has been contested by M'Clintock, E. Martin, and others, upon the whole, we think, unsuccessfully; while, in corroboration of his views, a considerable weight of practical evidence has accumulated, of which the following from Barnes' lectures is a striking illustration: "In the first place, let me state a fact which I have often seen. A woman with a slightly contracted pelvis, in labour with a normal child presenting by the head, is delivered, after a tedious delay, spontaneously or with the help of forceps; the head has undergone an extreme amount of moulding, so as to be even seriously distorted. The same woman in labour, again, is delivered breech first; the head exhibits the model globular shape, having slipped through the brim without appreciable obstruction. In the second place, I have, on several occasions, been called to an obstructed labour in which the head was resting on a brim contracted in the conjugate diameter. Of course, nature had failed; the *vis a tergo* was insufficient. I have tried the long double-curved forceps, trying what a moderate compressive power, aided by a considerable and sus-

[1] See Figs. 165 and 166, p. 533.

tained traction, would do to bring the head through, and have failed. I have then turned, and the head, coming base first, has been delivered *easily*. Upon this point I cannot be mistaken."

The operation of turning in contracted pelvis may thus present itself to us under two distinct aspects; as a substitute for the long forceps, and as a substitute for craniotomy. As regards the former, the experience of many independent observers would seem to show that, on the principle suggested by Simpson, turning may succeed when the forceps will fail; that instrument being, therefore, applicable to those cases only in which the contraction is moderate in degree. Owing to the difficulty of ascertaining the exact dimensions of the head and pelvis, a safe, and, we believe, a very general practice, is first to make a cautious attempt with the long pelvic-curved forceps, and, failing that —which, in skilful hands, is a safer operation to the mother—to proceed at once to turn. Turning, as a substitute for craniotomy, is a more important point still, so important indeed, in a conservative sense, that it cannot fail to command the attention of every conscientious practitioner. Impaction of the head, or difficulty of displacing it, so as to admit of the passage of the hand, and a degree of pelvic contraction beyond the limit which we have stated, are the two principal contra-indications of the operation of turning. The death of the child is not necessarily so, for craniotomy at the brim is by no means so safe an operation but that it may fairly be balanced against turning, even in the interests of the mother alone.

The operator must be prepared, in turning in a contracted pelvis, to encounter special difficulties in individual cases, which it is impossible fully to describe, or even to anticipate. Following the example of all writers on the subject, we have alluded to the operation in reference only to simple conjugate contraction at the brim, by far the most common of all the varieties of distortion. It requires no argument to show that rules applicable to this alone must often fail. In the typical malacosteon pelvis, we may find an actual increase in the conjugate diameter, coupled with such deformity as may render craniotomy, or possibly the Cæsarian

Fig. 186.

Malacosteon Pelvis.

operation, the only practicable methods of delivery. In those cases in which there is a symmetrical distortion, it is of importance that the large or occipital end of the head should, if possible, be thrown into the larger half of the pelvis. To effect this is, however, a matter of very considerable difficulty; and we apprehend that the rules laid down by E. Martin and others for effecting the object cannot be held as being of much practical value. The accoucheur must in no case lose sight of the infinite varieties of distortion to which allusion has already been made, as these may at any time call for special adaptations, to which thorough operative capacity and an intimate knowledge of the subject can alone guide us. Another possible difficulty we have known to occur in connection with twin pregnancy, in which the operator, after introducing his hand, has seized the foot of the wrong child.

Bi-Polar Method.—The operation to which alone we have hitherto alluded, is the ordinary operation of turning, necessarily involving the introduction of the whole hand within the cavity of the womb. There is, however, another operation, or rather a modification of this operation, which may be practised with less risk to the mother, and even, as it would seem, under circumstances which would render the ordinary procedure difficult, if not impossible. This is Bi-manual or Bi-polar Version, an operation which is attracting, year by year, more and more of the attention which it merits. Early in the present century, Wigand suggested a method whereby the presentation of the child could be altered without the slightest risk to the mother, by external manipulation alone. His observation applied to transverse presentations only, and his plan was—having ascertained, by vaginal examination, the exact position of the fœtus—so to press upon the child externally, as to bring to the os uteri that pole of its long diameter which was lowest in the pelvis. In a word, he claimed to be able to practise both cephalic and podalic version, without even introducing a finger into the vagina, although he seems to have employed the inner hand to guide or receive the head or breech into the os. The directions which he gives include elaborate, but, we fear, impracticable instructions as to the manner in which we should proceed—with the view of availing ourselves, to the utmost, of gravitation—to place the patient, now on one side, and again on the other, at various successive stages of the operation. It is quite certain that Wigand never contemplated anything more than partial version, so that his novel manœuvre, which found considerable favour in Germany, was never supposed to be applicable to cases of placenta prævia, nor to any other case in which the head is originally the presenting part.

Dr. Robert Lee seems to have been the first to suggest a method of turning, which is the opposite of that to which Wigand lent the weight of his authority. In cases of incomplete dilatation of the os uteri, he brought two fingers, which he passed into the uterus, to bear upon the head, which he first of all attempted to displace; and, when he had succeeded in this, he successively pushed aside those parts which came opposite the os in the same direction as that in which the head had disappeared, until, ultimately, the feet were made to present, or were brought within reach of the finger, and so secured. It is to Dr. Braxton Hicks that we in this country owe the method of combined external and internal version, although, as has already been stated, the claim of priority has been made out in favour of Dr. M. B. Wright of Cincinnati. This procedure bids fair to supersede, in a great measure, the old method, and we can unhesitatingly, and from personal experience, vouch for its efficacy in practice. The conditions which have already been mentioned as favourable to ordinary podalic version, are even more essential to the successful performance of the bi-polar method. Unless, therefore, the child is movable with tolerable freedom within the uterus, we can scarcely expect to succeed in effecting version by this, as we should probably fail by the other method. But, until we have thoroughly tried the effect of anæsthetics in reducing rigidity and tonic contraction of the uterine fibre, we should not too readily abandon the chance which this operation may possibly afford us, and we may be sure that if, at any stage, the conditions which are generally considered to be favourable to the ordinary operation are manifested, we may hope to succeed by this process. The bi-polar operation is, as will be inferred, a combination of the methods of Wigand and Lee, in the course of which, while the operator brings one hand to bear upon the uterus through the abdominal walls, he simultaneously operates upon the other end of the child by means of the finger which he has introduced into the vagina and through the os uteri, causing the one pole to descend, as he encourages the other to recede.

In so far as transverse presentations are concerned, we are indebted to Dr. Robert Lee for having first clearly pointed out that when the child is situated quite transversely within the womb, its knee is generally within a finger-length of the os uteri, and thus in some transverse presentations, it is not very difficult to hook down the knee. The child, however, as both he and Wigand have shown, does not usually lie transversely, but rather obliquely in regard to the transverse axis of the uterus, which removes the knee to some extent from the immediate grasp of the finger, and brings at the same time the operation of cephalic version somewhat more within the range of possibility. But,

while we thus recognise, as we can scarcely fail to do, the advantage of the bi-polar method over either of those in which one pole only is acted upon, the former admits, as will be seen, of a far more extended application, such as was never sought to be accomplished, so far as we can see, either by Wigand or Lee. In cases of placenta prævia, therefore, or in cases of contraction of the brim of not less than three inches in the conjugate diameter, the head being the presenting part, it is quite possible, and in some instances by no means difficult, to effect complete version by the bi-manual method, and thus avoid many of the risks of the ordinary operation. For the details of this procedure we shall here quote the directions of Dr. Braxton Hicks.

"I will now proceed to describe the mode by which I effect podalic version. We will suppose a case where everything is natural; the os uteri dilated to admit one or two fingers, membranes perfect, and the face towards the right side. The patient may be placed in the ordinary obstetric position. Having lubricated my left hand, I introduce it as far into the vagina as is necessary, in order to reach a finger's length within the cervix. Sometimes it requires the whole hand, sometimes three or four fingers will be sufficient in the vagina. Having clearly made out the head and its direction, whether to one side or other of the os uteri, I place my right hand on the abdomen of the patient towards the fundus; I then endeavour to make out the breech, which is seldom a difficult matter. The external hand then presses gently but firmly the breech to the right side; as it recedes, so the hand follows it either by gentle palpation, or by a kind of gliding movement over the integuments, while at the same time the other hand pushes up the head in the opposite

Fig. 187.

Bi-manual Version: First Stage.

direction, so as to raise it above the brim. It may be mentioned that, when the head has descended a considerable distance into the pelvic cavity, or more than half way through the os uteri, it is scarcely possible to lift it above the brim, especially if the uterus be active.

"When the breech has arrived at about the transverse diameter of the uterus, the head will have cleared the brim, and the shoulder will be opposite the os. That is pushed on in like manner as the head, and after a little further depression of the breech from the outside, the knee touches the finger, and can be hooked down by it. It very frequently happens, when the membranes are perfect, that, as soon as the shoulder is felt, the breech and foot come to the os in a moment, in consequence of the tendency of the uterus to bring the long axis of the child coincident with that of its own. Should it, therefore, be difficult to hook down the knee, depress the breech still more, and it will be almost always the case that the foot will be at hand.

"It will, sometimes, render turning more easy if, as soon as the head is above the brim, we pass the outside hand beneath it, and push it up from the outside alternately with the depression of the breech. All this can generally be performed in a much less time than I have taken to describe it, although in some it requires gentle, firm, and steady perseverance, with such a supply of patience as is always demanded in obstetric operations. If the os will only admit one finger, and the foot cannot be brought through in consequence, it can yet be retained at the os by pressing it with that finger against the inner surface of the os; the most convenient part being against the anterior part, because the pubes will assist in supporting the pressure, while, at the same time, in most persons, unless very stout, the hand pressing externally above the pubes is capable of assisting materially in retaining the leg in that position, and securing the

Fig. 188.

Second Stage.

altered change, ready for us to take advantage of it, should the case so require, as soon as the os dilates sufficiently; and the mere retention of the leg here is of considerable value, for, in cases of turning, even when we cannot effect turning immediately after having seized one of the limbs, yet the holding on to that part, and thereby fixing it, ultimately produces such an improved relationship between the uterus and its contents that the after operations succeed more easily. Should the child face towards the left side, the only difference required in operating is, that the breech be pressed toward the left side, and the head to the right."

Further on, in regard to Cephalic version, Dr. Hicks continues:—"We will suppose, first of all, a case where the uterus is not active, the liquor amnii not escaped, or only recently so, where the fœtal head has not passed the os. Introduce the left hand into the vagina as in podalic version; place the right hand on the outside of abdomen in order to make out the position of the fœtus, and the direction of the head and feet. Should the shoulder, for instance, present, then push it with one or two fingers through the cervix in the direction of the feet. At the same time, pressure by the outer hand should be exerted on the cephalic end of the child. This will bring down the head close to the os; then let the head be received upon the tips of the inside fingers. The head will play like a ball between the two hands; it will be under their command, and can be placed in almost any part at will. Let the head, then, be placed over the os, taking care to rectify any tendency to face presentation. It is as well, if the breech will not rise to the fundus readily after the head is fairly in the os, to withdraw the hand from the vagina, and with it press up the breech from the exterior. The hand which is retaining gently the head from the outside should continue there for some little time, till the pains have ensured the

Fig. 189.

Third Stage.

retention of the child in its new position by the adaptation of the uterine walls to its form."[1]

We shall make no apology to the reader for the length of this extract, and the prominence which we have thus given to the operation of bi-polar version, as we look upon it as one of the most important improvements in modern obstetrics, which is attracting an amount of attention ever on the increase, and which is, if we mistake not, likely, ere long, to take the place of the more familiar procedure of ordinary podalic version.

The postural method, to which reference has already been made, has been suggested by Dr. Edwin R. Maxson, of Syracuse, N.Y., as applicable to cases of transverse presentation;[2] and, although we at once recognise an objection to this procedure in the impossibility of safe anæsthesia, it must at the same time be admitted that the suggestion is an important one, and the cases which Dr. Maxson quotes in support of his theory are both significant and striking. He assumes that the proper treatment in all ordinary transverse cases is to "push back the shoulders or get the head," and this, he assures us, is in most cases readily effected by placing the patient in the genu-pectoral position, when the shoulder can be readily displaced, and the head brought down by the same hand. This, we apprehend, is a method of treatment which, either alone or in conjunction with the bi-polar manipulation, may possibly prove to be a valuable addition to the means at our disposal in effecting the operation of turning in any of its varieties.

[1] On Combined External and Internal Version: by J. Braxton Hicks, M.D., F.R.S., &c. London, 1864.

[2] See American Practitioner. March, 1877.

CHAPTER XXXII.

EMBRYOTOMY.

Conditions which warrant the Operation.—CRANIOTOMY.—*Consists of various Stages.*—*Perforation: Method of, and Precautions to be observed in Perforating: Cranial Contents to be Broken up and Dislodged.*—*Traction to be now Employed.*—*Use of the Crotchet: Where to Fix it: Dangers of: The Guarded Crotchet.*—*The Craniotomy Forceps.*—*Removal of the Vault of the Cranium: Protection of the Maternal Tissues: Davis' Osteotomist: The Scalp to be Preserved.*—*Turning after Craniotomy.*—*Canting the Base, after Removal of the Flat Bones, and Bringing the Face Downwards.*—THE CEPHALOTRIBE: *French and English Models:* "*Cephalotripsy*" *the Final Stage in the Operation of Craniotomy: Details of the Operation: May the Cephalotribe be used as a Tractor?*—*Subsequent Extraction of the Trunk.*—*Craniotomy in Breech Delivery, after the Passage of the Trunk.*—*Cranioclasm.*—EMBRYULCIA: *Evisceration of the Fœtus: applicable chiefly to Impacted Transverse Presentation.*—*Van Huevel's Forceps Saw.*—*Cranial Section by the Ecraseur.*

EMBRYOTOMY is, in one sense, the most objectionable of all the operations of Midwifery, for, of all other possible modes of procedure, this is the one which most certainly involves destruction of the child. On this account, the accoucheur shrinks, with natural repugnance, from an operation which necessarily implies mutilation of a dead, and must destroy a living, child. Such, however, is a view which we are apt to carry to an extreme, and overlook, in so doing, the more important interests of the mother, while we forget that circumstances do arise, when, in full knowledge of the fact that the fœtus lives, it may be the duty of the accoucheur unhesitatingly to sacrifice the child, as this is the only means by which he may reasonably expect to save the mother.

Our first and earnest desire, of course, is to save, if it be possible, the child as well as the mother; but, if it should become obvious that all hope of a result so favourable must be abandoned, we may be sure that we are fully justified in giving up the child, if we recognise in this

the only mode of preserving the more important life. Nothing, of course, will justify this, short of an absolute conviction that the vectis, the forceps, and turning, are of no avail; for then, and then only, are we justified in laying aside the implements of conservative midwifery, and taking into our hands agents which are destructive to the child. On the Continent generally, and especially in Roman Catholic countries, where the religious element comes more prominently into play, fœtal life is, it must be confessed, more jealously guarded than with us. But, while we fully recognise the humane impulses which may thus sway a purely scientific decision, it must be affirmed that, whenever it is certain that a living child cannot pass, nothing can be more irrational than to await the death of the child, before we act upon the conviction that it cannot live—and thus allow the period to pass at which we may confidently operate in the expectation of preserving maternal at the sacrifice of fœtal existence.

However lightly, on the other hand, we may view these considerations, evidence of the death of the child will always be held as of paramount importance, in all cases in which the operation of Embryotomy may offer itself for our consideration. When this is clear, all scruples will vanish, as we have the mother alone to consider, and, therefore, when the other modes of procedure are impracticable, we will proceed without hesitation to the performance of an operation which treats the dead fœtus as a mass of inert matter, to be removed at the least possible risk to the mother.

Conditions requiring Embryotomy.—The conditions, then, which may be held as warranting the operation of Embryotomy are those in which the Forceps and Turning are of no avail, and which, at the same time, preclude the passage of a living child. In so far as contraction of the conjugate diameter at the brim is concerned, we have already seen that, in the case of a fully-developed child, we can scarcely expect a successful result from turning, when that diameter is much less than *three inches;* and this, therefore, we may take as the limit within which the operation may be demanded. Tumours of any kind—bony, malignant, or ovarian; atresia of any portion of the ordinarily distensible canal; impaction of the head, or extreme contraction of the uterus, are illustrations of other causes which, independently of ordinary pelvic distortion, may render delivery by embryotomy the only method from which we can anticipate a favourable result. Although the history of former labours is, in such cases, to be admitted as an important consideration in determining our course of procedure, the conclusions of many independent observers show very clearly that this must not be allowed to take too prominent a position, as it not unfrequently happens

that women who have had an ordinary labour before, under circumstances which are apparently similar, are, if not relieved, subjected in subsequent labours to the greatest peril. This may be due, according to Barnes, to progressive pelvic contraction, or, as D'Outrepont holds, to progressive increase in the size of the children. But, on the other hand, we may fall into the opposite error—if Dr. Matthews Duncan's opinion is correct that, after women have attained the age of twenty-nine, the weight of their children falls—by supposing, that because craniotomy was found necessary on a former occasion, it must necessarily be required in subsequent pregnancies which have been allowed to go to the full time. Among the rarer conditions demanding craniotomy, are impacted mento-posterior positions of the face, cases of locked twins, in which one head can only be relieved by perforating and reducing the bulk of the other, double-headed monsters, and hydrocephalus.

There are, however, in addition to these, certain conditions of the mother which may call for the operation. It has already been shown that, in cases in which, from any cause, speedy delivery is required, turning is to be preferred to the forceps, when the dilatation of the os is not sufficient to admit of the safe use of that instrument; and to this it may now be added, that an even less degree of dilatation of the os will suffice for craniotomy than for turning, as all that is essential is space for the introduction of two fingers and the extremity of the perforator. In certain cases of convulsions, when there is great exhaustion, and in some instances of rupture of the uterus as already particularized, in which the state of the os forbids both the forceps and turning, it may be necessary for us to perforate. As a rule, however, and excepting the cases of rupture of the uterus alluded to, we should never operate by craniotomy while there is a possibility of nature prevailing, until we have given her a fair chance, and have waited to see what may be effected by the ordinary process of moulding.

The condition of the parts, or the stage of labour at which the operation should be performed, is a matter of great importance, less perhaps in regard to the mere facility with which it may be effected than with reference to the safety of the woman. Although, as has been observed, a very moderate dilatation of the os is all that is essential, it affords great comparative facility to the operator, and proportionate safety to the mother, the further the process of dilatation has advanced. It is of even greater importance that the head should have descended, to some extent, into the pelvis, and be within easy reach; for the operation upon a head which is still above the brim will be found, even under circumstances which are in other respects favourable, to be a very

different operation from that in which it is arrested within the cavity of the pelvis. There are conditions, however, which may render embryotomy manifestly impracticable, or which may admit of doubt; so that the peculiarities of individual cases must be our guide as to whether anything is to be gained by delay, and, if so, to what extent we are to maintain an expectant attitude. It is certain that we have less choice here as to the period which we may select for the operation than obtains in regard to some of the other modes of procedure which we have described.

Craniotomy.—Embryotomy almost always involves craniotomy, so that the two terms are often used as synonyms. Craniotomy has been often euphemistically described as "lessening the bulk of the head." It consists of several stages, some of which may alone be required; or it may be necessary, before effecting delivery, to go through the whole of them, one after the other. We purpose, therefore, to explain these successive steps, as points in detail of one method of operative procedure, according to the degree of pelvic distortion, or other condition which may constitute the special impediment.

Perforation.—The first step in all operations of craniotomy is perforation, and for this various instruments have been devised, which are termed perforators. The condition of the head upon which its impaction or resistance depends, is, in the first place, to be overcome, in order to permit of its collapse, and it is with this object solely that we perforate, and so act otherwise as to admit of the escape of the contents of the cranium, so that the forces, natural or artificial, may be brought to bear upon a part which is now susceptible of a considerable diminution in its diameters. The form of instrument which has by many Continental practitioners been preferred, is one which, in the principle of its construction, is almost identical with the ordinary trephine; but what is preferred and invariably used by English operators, is some modification of the perforating scissors of Smellie. The instrument here shown (Fig. 190) is that which was used by Simpson, and which generally bears his name. It consists of two blades with shoulder-stops, the blades, when in apposition, forming a triangle of which the base is at the stops, with cutting edges, converging to a point which is the apex of the triangle. The instrument is thus one which is to be used with the greatest possible caution, lest injury should be inflicted upon the soft parts of the mother. When the blades are separated by pressing the handles together, a powerful spring between the latter causes them to close so soon as the grasp is relaxed. Its mode of application is as follows. The ordinary preliminaries to the other operations of midwifery having been carefully

observed, the woman is to be placed, as usual, upon her left side. Two fingers of the left hand are then introduced into the vagina, and brought to bear upon the most depending portion of the vault of the cranium. With the greatest possible caution, the blades are then to be passed along the palmar aspect of these fingers, which serve as a guard to the maternal parts, until it reaches the surface of the cranium, through which it is thrust by a combined pushing and boring movement as far as the stops. While this is being effected, particular attention should be given, so that the force be applied at right angles to the surface against which it impinges, otherwise the point is apt to glance off, and may seriously wound the mother.

Fig. 190.

Simpson's Perforator.

Some have advised that perforation should be effected at the sutures or fontanelles, but, although this renders the operation somewhat easier, the disadvantage is that the subsequent collapse of the head, by overlapping of the flat bones of which its vault is composed, will necessarily obliterate the aperture and impede the escape of the cerebral tissue. It is, therefore, much better that we should perforate the parietal bone which presents, and, when this has been done in the manner described, the handles are pressed together and the blades separated. This, by tearing asunder the parts, makes a lacerated and irregular gap in the cranial walls; but, in order to render the aperture more patent, and thus facilitate the escape of the contents, the handles are turned so as to bring the blades half round, and another similar incision is made at right angles to the first. The perforator is then to be thrust into the cavity of the cranium, and freely moved about in all directions so as to break up, as far as possible, cerebrum, cerebellum, and membranes; and if the child is alive, it will be proper to pass it in the direction of the medulla oblongata, so as to cause its death, as cases have occurred in which, after perforation and escape of a portion of the cerebrum, the child has been born alive. The perforator is then to be removed with the same precaution as was observed on its introduction. If the breaking up of the brain has not been satisfactorily accomplished, this may be completed by the crotchet, which, indeed, some operators prefer altogether for this purpose, withdrawing the perforator so soon as the breech in the cranial walls has been effected.

Decerebration.—Complete disorganization of the textures within

the cranium does not necessarily imply their immediate expulsion, which can alone ensure collapse of the cranial vault. This, no doubt, has already been in a great measure effected by the nature of the aperture which we have made in the parietal bone; but, unless uterine action is present, and can act efficiently upon the cranium, the amount discharged, even through a considerable gap, may be but trifling. In order, therefore, to encourage compression, and the consequent diminution of the cranial diameters, the almost invariable practice is to remove as well as to disintegrate the brain substance. This can be effected with perfect safety by the aid of a scoop or spoon, or by the injection within the cranium of a powerful stream of water. So soon as a large portion of the cerebral contents has been permitted to escape, the bones of the skull will collapse under the influence of very trifling compression. This, however, may completely fail, whence arises the necessity of proceeding to another stage of the operation.

Extraction.—If nature, after complete decerebration, fails to effect some advance of the head, it will then be proper to attempt delivery by traction exercised upon any part of it where a secure hold may be maintained. The ordinary crotchet, described in a former chapter (see Fig. 183), is the instrument which was almost exclusively employed in ancient times, and even in the present day is frequently resorted to. The idea here is to fix the crotchet upon any part of the bones, and, if possible, at the foramen magnum or the sella Turcica, where the best and most effective grip may be had with the least risk of slipping. The directions which are very generally given by the older writers for the employment of the crotchet after perforation, for the purpose of traction, seem to point to fixing it upon some part of the inner surface of the parietal bone, and, having thus secured a good hold, to drag steadily downwards. The great objection to the use of the crotchet in this way is that it is always unsafe, and, in the hands of the inexperienced, eminently dangerous. No one uses the crotchet for this purpose, unless he has previously passed up the finger of one hand, in order to protect the soft parts from the possible effects of a sudden and unexpected detachment of the instrument, which, under other circumstances, would probably inflict upon the mother severe, and possibly dangerous laceration. As it is often difficult efficiently to protect the parts by means of the finger, an instrument called the "guarded crotchet" has been devised. It is variously constructed, but consists essentially of two blades, or rather of a crotchet and a protecting blade. In that which is here shown (Fig. 191), the crotchet has three sharp teeth, and is furnished with the ordinary forceps joint, by which it is articulated with the protecting blade. This crotchet being introduced

within the cranium, fixed in the ordinary manner, and the guard being then passed in the usual way outside of the scalp, the instrument is locked, which, so long as this relative position is maintained, prevents all possibility of laceration by the sharp part of the instrument.

The danger to the mother is, however, in point of fact, less from the crotchet itself, than from the fracture and sudden displacement of the bones to which it is attached. Should the tractile force be trifling, the hold which the crotchet gives us may be maintained; but if, as is more generally the case, we are obliged to use a considerable degree of force, it is very apt to slip from its attachment, or to become disengaged in consequence of fracture of the bone. It is on this account that the guard of the crotchet cannot alone be trusted to, and we must therefore pass up the finger, which should be retained in apposition with the head so long as our efforts may last, so that we may at once perceive the earliest indication of slipping, and adopt such precautions as may be necessary for the protection of the maternal structures.

Fig. 191 Fig. 192.

Guarded Crotchet. Craniotomy Forceps.

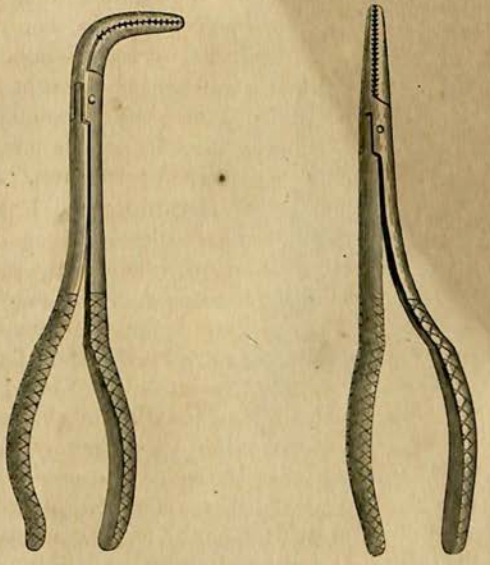
Craniotomy Forceps.—This instrument is, as now constructed (Fig. 192), greatly superior to the crotchet either single or guarded, and is applicable to almost all cases in which the latter has been employed. When perforation, with evacuation of the cerebral contents, has been completed, and it is found necessary to proceed to the further stages of the operation, the blades of the craniotomy forceps are to be applied, one within and the other without the cranium, that which is convex on the outside being for application over the scalp. It will be observed that one blade is fitted with sharp teeth corresponding to pits or depressions upon the opposed surface of the other.

Many forms of craniotomy forceps have been devised, other than that which has just been described—more or less simple in construction as the case may be—and, among the former we may

mention those recommended by Meigs of Philadelphia, and which are here represented (Figs. 193, 194). They are simply ordinary bone forceps of different sizes and shapes, and they have been found to be, in many cases, as useful in practice as they are simple in construction. All forms, however, are used pretty much in the same way, one blade being inside the cranium, and the other outside the scalp.

When suitably adjusted, therefore, all that the operator has to do is to press the handles together with some force, which will ensure a grasp upon the wall of the cranium, over a more extended area, as well as more firmly, than can, under any circumstances, be effected by the

Fig. 193. Fig. 194.



Meigs' Craniotomy Forceps.

ratchet. The handles being firmly bound or pressed together, traction must now be practised in the direction which may be proper in the actual position of the head. If the bone gives way, the detached portions must be cautiously removed, and a fresh hold obtained wherever the parts may seem most likely to bear the strain; but, when the resistance is great, it will soon become evident that this method of extraction will fail, and we must therefore pass to a still more advanced stage of the operation of craniotomy.

Removal of Bones.—The process which, under such circumstances, is rendered necessary, is the deliberate removal in detail of the flat bones, which require, for this purpose, to be broken up into pieces of convenient size, in order that the whole vault of the cranium may be thus removed, including, in extreme cases, the occiput and the forehead. No part of the operation requires more caution than the removal of the fractured portions of the bones, which are often jagged and splintered, and always sharp at the edges, so much so, sometimes, as to cut through the cuticle of the fingers of the operator, which may afterwards be observed to be scarred as if by the edge of a sharp knife. When our object is to remove the whole cranial vault, the bones are, in the first place, to be broken and separated from their attachments within the scalp—a part of the operation which may be effected by means of the craniotomy forceps. In this case, however, we introduce the blades somewhat differently, passing the outer blade between the scalp and the bone, so that the latter is directly grasped. A smart wrench by the wrist is generally all that is necessary to fracture the bone, when the severed portion which remains between the blades may be removed by the aid of the instrument. Much will, however, depend upon the shape of the fragment, which is to be carefully ascertained by the finger acting in concert with the forceps. If it is very irregular in shape, it will, of course, be all the more difficult to protect the soft parts of the mother from so many cutting surfaces, and it may be necessary to divide it again before attempting extraction. The mode of grasping the fragment must also be attended to, so as to bring elongated portions lengthwise, and in many similar ways we may reduce risk by careful manipulation.

Fig. 195

Osteotomist.

Osteotomist.—Dr. Davis was so impressed with the danger which attends the removal of the fractured cranial bones that he devised an instrument, or rather a series of instruments, which he termed osteotomists, by which the bones could be more safely removed. One of them is here shown (Fig. 195). It is of the nature of a powerful punch, by which successive minute portions of the bones may be nipped off and removed in the grasp of the blades, thus completely protecting the soft parts. Such an operation was necessarily a very tedious one, and this is probably the reason why the instrument

was never much employed, and has latterly fallen into complete disuse. We have, however, found it to be extremely useful in cutting any spicula or sharp angular projections which may seem to threaten laceration, and for this reason we look upon it as a most useful aid to have at hand when we have to perform the operation of craniotomy. By dexterous management, however, we may generally succeed in safely removing much larger pieces of bone by the fingers than can be effected by the osteotomist. Another useful instrument is the craniotomy scissors of Hodge, constructed with long handles and short powerful blades, and acting therefore in a manner somewhat similar to the more powerful osteotomist.

Preservation of Scalp.—In removing the vault of the cranium, it is proper to preserve the scalp. The object of this is to protect the maternal parts from injury. It may happen, after a certain amount of progress has been made, and a considerable portion of the vault removed, that the head collapses to such an extent that the difficulty is got over, and extraction becomes easy. In such a case, the scalp is used as a covering for the bones which remain, and as a protection from spicula and sharp edges, which might otherwise do mischief.

If, at any time in the process of removing the bones, or even earlier, we are able to seize the forehead by the craniotomy forceps and pull it down, this should always be done; but the difficulty in extreme contraction is that the vault of the cranium is not yet sufficiently compressible. It is mainly, therefore, with the object of ultimately bringing down the forehead, which usually lies to the right side, that we thus pick away the bones until there remains, when the process is complete, nothing but the scalp and the base of the skull.

Turning.—There is another method of procedure, not often resorted to, but which, in some instances, is of undoubted efficiency after perforation. This is the ordinary operation of turning, which may sometimes be effected without much difficulty when, by the perforator, we have reduced the bulk of the child's head. To attempt this in cases of very great distortion would, on many grounds, be improper; but in more moderate disproportion, it is sometimes an efficient and valuable method of completing delivery. A striking instance of this kind, which we saw with Drs. Lyon and Dick, was that of a woman in whom it had been found necessary to perforate in consequence of very considerable conjugate contraction. Traction with the craniotomy forceps was found to be insufficient, and failed to dislodge the head of the child. A considerable portion of the bones was then removed, but, before entirely removing them, and proceeding to the more advanced stages of the operation, to be described immediately, an attempt was made to turn,

when, the foot being brought within reach, this was effected without the slightest difficulty. In all such cases, it is of the first importance that the scalp should cover the fractured bones, and we should, therefore, be particularly careful that this should be ensured before we attempt to turn.

Canting the Base.—The flat bones being removed, the next question for consideration which presents itself is one which, without a thorough knowledge of the fœtal and maternal parts, could not fail to give rise to much doubt and apprehension. What remains behind of the head consists entirely of the base of the cranium, a part which, even at this early age, is very solid and unyielding, in order to afford protection to the vital structures which might otherwise be subjected to dangerous or fatal pressure. The shape of the base of the skull is that of an irregular ovoid disc, the long diameters of which are across the pelvis. It would seem, therefore, at first, as if no great advantage had been gained by the removal of the flat bones; but a moment's consideration will show that a very simple manœuvre, and one which is generally easy of performance, will suffice to place what remains of the head much more favourably. "I have carefully," says Dr. Burns, "measured these parts, placed in different ways, and entirely agree with Dr. Hull, a practitioner of great judgment and ability, that the smallest diameter offered, is that which extends from the root of the nose to the chin. For, in my experiments, after the frontal bones were completely removed, and the lower jaw pressed back, or its symphysis divided so as to let its sides be pushed away; this did not, in general, exceed an inch and a half. It is, therefore, of great advantage to convert the case into a face presentation." The practice thus recommended by Burns was at an earlier date upheld by Dr. Osborne, who was the first clearly to show that, by *canting* the base of the skull, so as to bring it edgewise into the brim, it was perfectly possible to deliver a full-sized child through a conjugate diameter measuring an inch and a half only. A very remarkable case, that of Elizabeth Sherwood, which is specially interesting as bearing upon the question which we are now considering, may here be detailed in a very abridged form. The circumstances of this case must, however, have been peculiar, or, possibly, the observation of the conjugate measurement was inaccurate.

The patient was so deformed, both in her spine and her lower extremities, "as never to be able to stand erect for one minute without the assistance of a crutch under each arm." At the age of twenty-seven she became with child, and was admitted a patient into Store Street Hospital, where she was seen by W. Hunter, Denman, and other eminent obstetricians of the day, who gave their sanction to the course of procedure which Osborne ultimately adopted with such remarkable

success. Dr. Osborne describes his first examination as follows:—"Immediately upon the introduction of the finger, I perceived a tumour, equal in size, and not very unlike in feel, to a child's head. However, it was instantly discovered that this tumour was formed by the basis of the sacrum and last lumbar vertebra, which, projecting into the cavity at the brim, barely left room for one finger to pass between it and the symphysis pubis, so that the space from bone to bone at that part *could not exceed three quarters of an inch.*" The operation which was determined upon (a decision which gave rise afterwards to no little discussion) was to effect extraction by the perforator and crotchet. "Even the first part of the operation, which in general is sufficiently easy, was attended with considerable difficulty, and some danger. The os uteri was but little dilated, and was awkwardly situated in the centre and most contracted part of the brim of the pelvis. The child's head lay loose above the brim, and scarcely within reach of the finger, nor was there any suture directly opposite to the os uteri." The operation of perforation and decerebration was effected without any unusual difficulty, and the patient was then left, as was the general practice in these days, for six and thirty hours, in order to allow the uterus opportunity to force the cranium downwards as far as possible within the reach of the crotchet, a result which was counted upon to some extent, as the effect of putrefactive change.

"I determined," he continues, "to begin to make an attempt to extract the child. *I call it an attempt, for I was far from being satisfied in my own mind of the practicability.* My first endeavours were bent to draw the os uteri with my finger into the widest part of the brim of the pelvis, and to dilate it as much as possible. But the removal of the os uteri, and such dilatation of it as the bones admitted, were effected without much trouble. I then introduced the crotchet through the perforation into the head, and, by repeated efforts, made in the slowest and most cautious manner, destroyed almost the whole of the parietal and frontal bones, or the whole upper presenting part of the head: and as the bones became loose and detached, they were extracted with a pair of strong forceps, to prevent, as much as possible, laceration of the vagina in their passage through it. The great bulk of the head, formed by the base of the skull, still, however, remained above the brim of the pelvis; and from the manner in which it lay, it was impossible to enter without either diminishing the volume, or changing the position: the former was the most obvious method, for it was a continuation of the same process, and, I trusted, would be equally easy in execution. I was, however, grievously mistaken and disappointed, being repeatedly foiled in every endeavour to break the solid bones which form the basis of the cranium, the instrument at first invariably slipping as often and as soon as it was fixed, or, at least, before I could exert sufficient force to break the bone. At last, however, by changing the position of the instrument, and applying the convex side to the pubis, I fixed the point, I believe, into the great foramen, and by that means became master of the most powerful purchase that the nature of the case admitted.

"Of this I availed myself to the utmost extent; slowly, gradually, but steadily increasing my force till it arrived at that degree of violence which nothing could justify but the extreme necessity of the case and the absolute inability, in repeated trials, of succeeding by gentler means. But even this force was to no purpose, for I could not perceive that I had made any impression on that solid bone, or that it had been in the least advanced by all my exertions. I became fearful of renewing the same force in the same way, and therefore abandoned altogether the first idea of breaking the basis of the cranium, and determined to try the

second by endeavouring to change the position. I, therefore, again introduced the crotchet in the same manner, and fixing it in the great foramen, got possession of my former purchase; then, introducing two fingers of the left hand, I endeavoured with them to raise one side of the fore part of the head, and turn it a little edgeways. Immediately and easily succeeding in this attempt, the two great objects were at once accomplished; for the position was changed and the volume diminished. Continuing my exertions with the crotchet, I soon perceived the head advance, and, examining again, found a considerable portion of it had been brought into the pelvis. Every difficulty was now removed, and, by a perseverance in the same means for a short time, the remaining part of the head was brought down and out of the os externum."

We cannot wonder that the result in this case, and the satisfactory recovery of the mother, should have been looked upon as a great triumph of the crotchet as compared with the otherwise inevitable expedient of the Cæsarian Section. Of late years this question has been more thoroughly investigated and illustrated. Dr. Braxton Hicks, in a learned and elaborate paper,[1] describes very fully the mechanism of the proceeding. What he recommends is to grapple the orbit and draw it downwards by means of a small blunt hook. "The one which I use," he says, "is of the following size: the diameter of the iron rod from which it is made is about a quarter of an inch, of the length of the ordinary blunt hook; with handle also alike. The hook is a half circle about one inch in diameter, and is made hard, to prevent its opening during traction; the shaft is made of soft iron, and can be bent by the hand into any form, being thus adaptable to any situation. I may mention here that this hook is useful, in other cases, in a variety of ways, where it is impossible to employ the unwieldy blunt hook in general use."

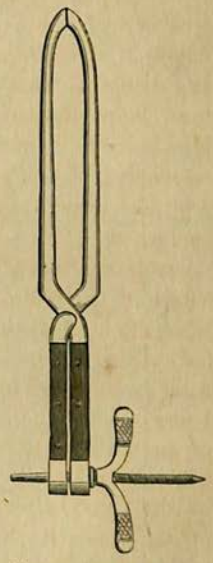
Dr. Barnes, after removing the arch of the calvarium, or the whole of the bones if the distortion be extreme, prefers, for effecting the same object, the craniotomy forceps. The instrument which he uses is of considerable strength, and is provided, like Braun's, with a screw at the ends of the handles, which secures for it the ordinary advantages of the cephalotribe, by crushing in the frontal bones, and has the further advantage of securing an unyielding hold. "Then traction is made, carefully backwards at first, in the course of the circle round the false promontory. As the face descends it tends to turn chin forwards, and this turn may be promoted by turning the handles of the instrument. It is not necessary that the turn should take place, for the case differs entirely from that of the normal head. There is no occiput to roll back upon the spine between the shoulders. The head comes through flat wise like a disc by its edge."

[1] Obstetrical Transactions, vol. vi., 1865, p. 263.

The above extracts, which represent the most modern and scientific modes of practice, will suffice to prove that where the pelvis measures *two inches*, or even somewhat less, in the conjugate diameter, a fully developed child may yet possibly be extracted. It is obvious, however—the transverse diameter of the face being more considerable—that, to ensure success, there must be a larger space, certainly not less than three inches in the transverse diameter. "I go further," says Barnes, in reference to this operation, "and declare that it is perfectly unjustifiable to neglect this proceeding, and to cast the woman's life upon the slender chance afforded by the Cæsarian Section."

The Cephalotribe.—If the facts and arguments above cited are strictly correct, the number of cases in which the cephalotribe is called for are probably very limited in number. They are certainly much more so than was at one time supposed. The earliest instrument designed for crushing the bones of the fœtal skull seems to have been the Compressor Forceps of Assalini, which was used by him to crush the base of the skull and the face, early in the present century. The blades of this instrument were not made to cross, so that when they were screwed together, the fulcrum of each lever was—as in his forceps—the joint at the end of the handles, where they were articulated. The only modern instrument resembling this in principle is the cephalotribe of Lazarewitch of Charkoff. What, with certain modifications, is known as the French cephalotribe, was invented by the younger Baudelocque. It is, in appearance, a most formidable instrument; the one in our possession weighing no less than 4 lbs. 6½ oz., and measuring across the blades nearly two inches, in the widest part. It requires, therefore, no argument to show that such an apparatus is not applicable to a case like that of Elizabeth Sherwood. Various modifications have, in modern times, been designed by Scanzoni, Braun, Simpson, and others, almost all of which are constructed with a moderate degree of pelvic curve. They are all made lighter than the original instrument, as it has been found that clumsiness may be, to some extent, avoided without any material sacrifice of strength. The tendency of the English instruments is to approach more in form to the ordinary midwifery forceps, as is well shown in Simpson's cephalotribe which is here represented (Fig. 196).

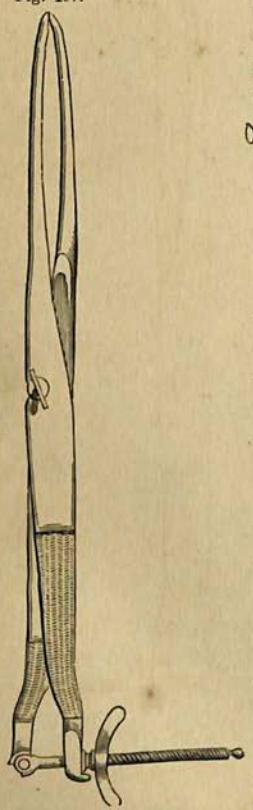
Fig. 196.



Simpson's Cephalotribe.

As in the case of the forceps, there has existed in this country some controversy as to whether the pelvic curve should or should not be adapted to the cephalotribe, those who approve of the straight instrument arguing with some force that the straight blades are easier of application, and can alone be properly applied when we wish to rotate. The fact that the head is at the brim seems to us, on the contrary, to indicate, on the same grounds which have been urged with reference to the long forceps, that unless we are, as Pajot and some others advise, absolutely to discard the instrument as an extractor, we must admit that the principle of the pelvic curve ought to be conceded here also. The objections which Dr. Kidd and others have urged against the pelvic curve have, however, so far prevailed, that the English instruments are all, without exception, made with a slighter curve than the French ones.

Fig. 197.



French Cephalotribe.

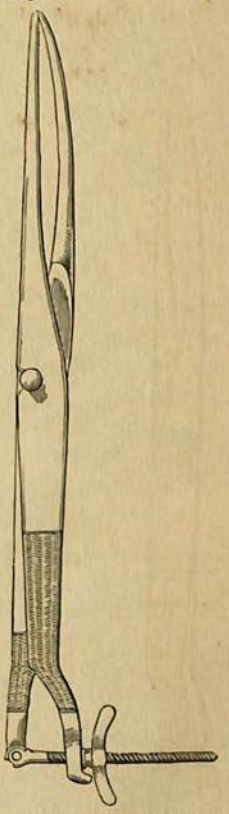
The French cephalotribes (Fig. 197) still retain, as we have said (and, we may add also, the German modifications of Braun and Scanzoni), much of the original formidable dimensions of the instrument. We might have contented ourselves with the mere mention of this fact were it not that of late years some able obstetricians have condemned the English instrument, and insisted that we should do better to adhere more closely to French models in the construction of cephalotribes. Dr. Matthews Duncan made some very interesting experiments with a view of comparing the effects of Simpson's cephalotribe and the more modern of the French instruments. The experiments were performed on fœtal crania, and on the skulls of dogs, and certainly served very clearly to demonstrate that the French cephalotribes have greater power. Are we, therefore, on that account, to prefer them, to the exclusion of those with shorter handles?

In reply to this question, Dr. Duncan expresses a decided preference for the French cephalotribe, a modification of which he has devised, so as to combine the lesser degree of pelvic curve which is characteristic of English instruments, with certain other modifications which he considers as offering some advantage. Dr. Duncan's cephalotribe is here represented. Drs. Barnes and Braxton

Hicks are, again, warm supporters of what we have termed the English cephalotribe, and, while they do not assert that the crushing force is equal to that of the French instrument, they maintain that the power is attained in sufficient perfection for the object which we have in view, and that there is a gain in the facility of handling, which may be held as sufficient to counterbalance any trifling loss of power.

We have at present to consider the subject of Cephalotripsy as the final stage of the operation of craniotomy in cases of great pelvic contraction. Perforation, decerebration, removal of the flat bones, and canting edgewise of the base of the skull have all, we shall suppose, been successively tried, but to no purpose. Can anything further, we ask ourselves, be done in this same direction?—a question which finds its reply in the operation which we are now considering. The object of the instrument is, as its name implies, to *crush* the unyielding base into a pulp, and thus bring it through the contracted diameters. The blades are introduced, in the same manner as those of the ordinary long forceps, in the direction in which there is least resistance, which will generally be the sides of the pelvis. They are passed high up, so as to reach quite beyond the base, which it is our object to crush; and, being adjusted, the screw is then turned steadily and cautiously while the finger within the vagina takes note of what is being done, and is ready to remove at once any spicula of bone which may crop up under the influence of the crushing force. Whatever form of instrument we may choose, it should be one which does not measure, when closed, more than an inch and a half outside the widest part of the blades. This admits, therefore, of such crushing as may enable the head to pass through a diameter which may be contracted to that extent. If the deformity is great, a second crushing may be necessary, and, for this purpose, the blades should be removed and re-introduced, so as to secure a grasp which should be, as nearly as possible, at right angles to the first.

Fig. 198.



Dr. Matthews Duncan's Cephalotribe.

It must not be supposed that it is only to cases in which the whole of the flat bones have been already removed that the operation of

cephalotripsy is applicable. On the contrary, it may often be used with advantage when only a portion of the vault has been got away. This is generally sufficient to admit of the easy introduction of the blades, so that, if unusual difficulty is experienced in extracting the bones, and the head refuses to advance under steady traction, the operation will have the double effect of crushing the base, and permitting the collapse of the skull with complete escape of all its contents. In this case, however, we should watch with special caution the effect of the compression upon the cranium, otherwise the maternal parts may, at any moment, be wounded by fragments of bone.

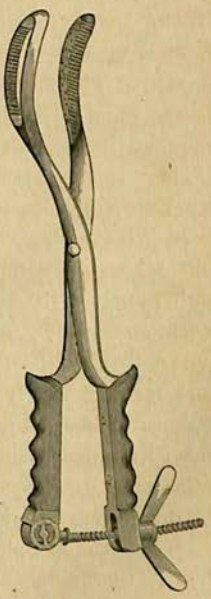
A subject which has given rise to no little discussion is whether or not we should, after crushing, use the cephalotribe as a tractor. Pajot condemns such a course, and recommends a procedure which he describes as "*cephalotripsie répétée sans tractions*," in which he leaves expulsion absolutely to nature. He also recommends—what, if feasible, is certainly advantageous—that we should rotate the head which has been operated upon, so as to bring its crushed diameter in relation with the contracted diameter of the pelvis. This condemnation of the cephalotribe as a tractor seems chiefly to be supported by those who, in France or elsewhere, uphold the use of the bulky instruments which are very obviously less suitable for such a purpose. What seems, therefore, to be the chief advantage of the lighter English instrument, is that traction may by it be more safely performed. Indeed, it appears to us in the highest degree irrational that we should forego all the advantages of traction which spring from such a firm grasp of the head as the cephalotribe gives. We cannot, indeed, be too cautious in our manipulations, but we can see no reason why, after efficient crushing, we should not pull gently with the handles backwards, which we can, of course, do with more safety and a greater advantage, than if there was no pelvic curve to the blades. Another disadvantage of removing the blades, and leaving the further progress of the case to nature, is said by Dr. Barnes to consist in the resiliency of the fœtal structures, so that a head flattened within the grasp of the cephalotribe so as to measure not more than an inch and a half, may spring out on the removal of the blades to more than two inches.

When the mutilated head at length glides through the chink which has so obstinately barred its progress, the young operator may hastily conclude that his difficulties are necessarily at an end. In cases of minor disproportion, it will no doubt be so; but, in extreme distortion, the descent of the shoulders and trunk may be attended with very considerable difficulty. If the remains of the head be still within the grasp of the cephalotribe, it is proper to continue the tractile force backwards,

as far as may be practicable with a due regard to the integrity of the perineal structures. This is done with the view of disengaging the anterior shoulder, or bringing it a little in advance, so that the blunt hook may be fixed in the axilla to pull it through. It may be necessary at this stage, when the blunt hook and crotchet fail to effect delivery, that the cephalotribe should be again used, and the trunk crushed prior to delivery, a proceeding which, although rarely necessary, is certainly preferable to the employment of such violence as might otherwise endanger the tissues of the mother. See last-born p. 620

There are cases in which it is found necessary to lessen the bulk of the head in breech presentations or after turning, the head being arrested after the trunk has been successfully disengaged from a contracted pelvis. In this case, the conditions of the operation are inverted, but are not by any means, as a rule, more difficult. Perforation may be effected behind the ear, and this situation should be selected as the point at which we may most readily attain the cavity of the cranium, and give exit to the brain substance, so as to permit of the collapse of the head. In this case also, the cephalotribe may be employed with great advantage, by crushing the base of the skull, which in this instance is in advance of the vault, and if the measurements are such as to have already admitted of turning, or of the descent of the breech, we may be almost sure that the collapse of the head which must now necessarily ensue, will amply suffice to permit of its passage through the pelvis.

Fig. 199.



Braun's Cranioclast.

Cranioclasm.—The instrument thus named may be described as occupying a position intermediate between the craniotomy forceps and the cephalotribe. The most familiar varieties are those of Simpson and Braun, the latter of which is here represented (Fig. 199). Like the cephalotribe, it is a crushing instrument, but much lighter in construction. It differs, however, from the former essentially in this, that it is much safer as a tractor, and, in point of fact, is thus perfectly applicable in all cases in which we might otherwise employ the craniotomy forceps, in the manner above described, for the removal of the flat bones, after perforation and decerebration.

Embryulcia.—When some part of the child other than the head presents, it may be requisite to use the perforator upon the trunk, and

endeavour to extract the child by the evacuation of the contents of the thorax and abdomen. This is one of the methods, for example, which have been practised in cases of transverse presentation in which turning is impracticable. There is no difficulty in such a case in making a breach in the thoracic walls, below the axilla, of sufficient size to admit of the removal of the lungs and heart, and subsequently, by perforation of the diaphragm, of the abdominal viscera,—the most important of these being the liver, which, as is well known, is of great size in the fœtus. The breaking up of the organs prior to their removal cannot be effected in the same bold manner as in craniotomy, as we might easily perforate the trunk, and wound the walls of the uterus. After thus reducing the bulk of the trunk, what should now be attempted is an imitation of the natural processes of spontaneous evolution, or spontaneous expulsion, which may be effected by forcibly dragging down the breech, by the blunt hook or otherwise, after the organs have been removed. This, however, is not always easy, and we have a vivid recollection of such a case, which we saw many years ago, where turning had been found impracticable, and embryulcia had been practised to the extent of removing the whole of the abdominal and thoracic organs. The crotchet and blunt hook were repeatedly fixed upon the pelvis and lower vertebræ, but without success, and the woman ultimately died undelivered. Looking back upon this case with the vividness with which memory recalls early experiences, we feel assured that the treatment proper to it ought to have been decapitation, and not evisceration.

Decapitation has been described in a previous chapter, and should, we believe, be always taken into consideration when the question of embryulcia in impacted transverse presentation crops up. Evisceration is not, however, limited to cases of transverse presentation, but may be found necessary, and has often been practised as a sequel of craniotomy, when it may be requisite to diminish the bulk of the trunk, on precisely the same principle as has guided us to perforation of the cranium at an earlier stage of the operation, where we cannot succeed in delivering by the blunt hook, crotchet, or any other instrument which we may employ purely for the purpose of traction. It is probable, however, that, under such circumstances, the process previously detailed, in which the cephalotribe is the agent employed, might be adopted with a better prospect of satisfactory results.

Van Huevel's Saw.—A very powerful instrument, but one rather complicated in its construction, is that which was invented by Van Huevel of Brussels, and has subsequently been adopted by some eminent Continental practitioners as a substitute for the crotchet,

cephalotribe, and other instruments which we have described as essential to the performance of craniotomy, under any circumstances which may involve greater difficulty than usual. This instrument is commonly known as the Forceps Saw, and consists, in the first place, of forceps, of which the blades are of unusual strength. On the inner aspect of the latter is a groove extending from about one inch below the extremity to near the lock. Within the groove, and protected by a band of steel, the chain saw is introduced after the blades have been adjusted, and is then made to cut from without inwards, or from the lock towards the tips of the blades, until the head has been divided—the chain being worked by two small cross handles at its extremities, while its action, protected by the blades of the forceps, may be looked upon as absolutely safe.

Wire Ecraseur.—Dr. Barnes has suggested another operation, by which the wire écraseur may be used for the purpose of bisecting the head, or otherwise operating upon the body of the fœtus. This method of performing Embryotomy was demonstrated by the inventor before the Obstetrical Society, the instrument employed being the écraseur of Braxton Hicks. He recommends the employment, not of the wire rope suggested by Hicks,[1] but of a single loop of strong steel wire, which he manipulates, so as to pass it through the cervix uteri and the chink of the pelvic brim. The crotchet being passed into the hole made by the perforator, and held by an assistant, so as to steady the head, the loop is guided over the crotchet to the right side of the uterus, where the face lies. "The compression being removed, the loop springs open to form its original ring, which is guided over the anterior part of the head. The screw is then tightened. Instantly the wire is buried in the scalp; and here is manifested a singular advantage of this operation. The whole force of the necessary manœuvres is expended on the fœtus. In the ordinary modes of performing embyrotomy, as by the crotchet especially, and in a lesser degree by the craniotomy forceps and cephalotribe, the mother's soft parts are subjected to pressure and contusion. The child's head, imperfectly reduced in bulk, is forcibly dragged down upon the narrow pelvis, the intervening soft parts being liable to be

[1] We have frequently employed this instrument for the removal of uterine polypi, and in other similar operations, but have found that the wire ropes suggested by the inventor are not to be depended upon, and are apt to snap under a powerful strain. Thinking at first that this was due either to some imperfection of the instrument, or to some fault in the annealing of the wire of which the rope was composed, we consulted Dr. Hicks, who was so obliging as to order a complete instrument and ropes, after his own model; but the result was still far from satisfactory. From the experience we have since had of the single steel wire suggested by Dr. Barnes, we are inclined to give it a decided preference.

bruised, crushed, and even perforated. And this danger, obviously increasing in proportion to the extent of the pelvic contraction, together with the bulk of the instruments used, deprives the mother in all cases of extreme contraction, of the benefit of embryotomy, leaving her only the terrible prospect of the Cæsarian section. When the anterior or posterior segment of the head is seized in the wire loop, a steady working of the screw cuts through the head in a few minutes. The loose segment is then removed by the craniotomy forceps. In minor degrees of contraction, the removal of one segment is enough to enable the rest of the head to be extracted by the craniotomy forceps. But, in the class of extreme cases, in which this operation is especially useful, it is desirable still further to reduce the head, by taking off another section. This is best done by re-applying the loop over the occipital end of the head."

A word may here be added as to the probable range of cases within which the cephalotribe may be applied. Much will of course, depend, as has already been observed, upon the degree of contraction, not only of the conjugate, but of the other diameters of the pelvis. In a discussion on this subject, held at Berlin, the majority of the speakers thought that a minimum of two inches in the conjugate diameter was necessary. Credé, Pajot, Hicks, and Barnes have however encountered cases in which the contraction ranged from one and three quarters to one and a half inches, and have yet been able successfully to accomplish the operation. It is important that facts such as these should be borne in mind when we have to consider the *dernier ressort* of operative midwifery, —the Cæsarian section—which will form the subject of the following chapter.

Cæsarian Sect

CHAPTER XXXIII.

HYSTEROTOMY AND ALLIED OPERATIONS.

History of the Operation of HYSTEROTOMY.—*Cases in which it is Justifiable.*—*Maternal Mortality: Different Results in British and Continental Practice.*—*Conditions favourable to Success.*—*The Operation and its Details: Duties of the Assistants: Closure of the Wound.*—*After-Treatment.*—*Causes of Fatal Result.*—*Effect of Cold in preventing Peritonitis.*—*Repeated Success of the Operation in the same Cases.*—PORRO'S OPERATION.—GASTRO-ELYTROTOMY.—GASTROTOMY: *Cases in which Operation is required.*—*The so-called Vaginal Cæsarian Section.*—SYMPHYSIOTOMY: *History and nature of this Operation: Objections to it.*—*Stoltz's Operation of* PUBIOTOMY.—*Tabular Statement showing the Degree of conjugate Contraction at the Brim, which may be supposed to indicate respectively the Operations of the Long Forceps, Turning, Embryotomy, and the Cæsarian Section.*

HYSTEROTOMY or, as it is more familiarly known, the Cæsarian Section, is an operation whereby the fœtus is extracted through an opening which is made in the abdominal and uterine walls. The propriety of such a procedure, in the case of the sudden death of the mother, is, in the hope of extracting a living child, so obviously a course to which no exception can be taken, that nothing need be urged in justification of the operation in the abstract.

From the earliest period in the history of midwifery, it had been occasionally practised on women dying during labour; and the names of Scipio Africanus, Manilius, Andrea Doria, and others are recorded as having been brought into the world under such circumstances, in obedience the law of Numa, which forbade the burial of a pregnant woman in whom the operation had not been performed. About the end of the sixteenth or the beginning of the seventeenth century, it would appear that the operation had been performed in cases in which the child had escaped into the cavity of the peritoneum; but as this

proceeding is not, properly speaking, the Cæsarian Section, these cases are only to be regarded as instances of Laparotomy or Gastrotomy. It is not precisely known at what epoch Hysterotomy was first performed on the living woman, for there is every reason to believe that the cases published by Rousset in 1581 were to be referred chiefly to the preceding category. The publication of Rousset's work, celebrated in the history of the subject, gave rise to the most extravagant expectations, and at one time the operation was so recklessly performed by surgeons, that it was only by the uncompromising attitude of Guillemeau and Ambroise Paré that it fell into disfavour. It is of this period that Scipio Merunia spoke when he talked, with pardonable exaggeration, of the operation being as common in France as bleeding in Italy. The opposition thus encountered in such influential quarters had well nigh condemned the Cæsarian operation to oblivion; but it was again revived, and gave rise to endless and bitter discussion during the whole of the seventeenth, and, we may add, the first half of the last century, without anything definite having been elicited or determined upon, the profession being divided into two parties, one of which condemned the operation in the most uncompromising way, while the other as warmly, and with even less of discretion, was enthusiastic in its support. It will be observed, therefore, that the Cæsarian Section, as now calmly looked upon in the light of science, dates from quite modern times.

While it must be admitted that every step in advance which has been established by conservative midwifery throws further into the shade the sacrificial or more desperate operative resources of the art, there probably exist no practitioners in the present day who will not admit that there are cases in which hysterotomy is justifiable, on grounds which will stand the test of the strictest scientific examination. Putting aside, for the moment, the cases in which it may be practised upon the dead, it may be broadly asserted that the operation is called for in the living in all cases in which the state of parts is such as to preclude the possibility of delivery by embryotomy. In other words, we are driven to this last resource, wherever we recognise the fact that the fœtus, however mutilated, cannot be extracted by the pelvic canal.

Considerable difference of opinion unfortunately exists as to the limit of contraction which will warrant the performance of Hysterotomy. In Germany, it is very generally asserted that two and a half inches, in the conjugate of the brim, is to be held as the limit in question; but there are, in so far as we are aware, none in this country who endorse this view. What has already been said in the preceding chapter affords ample proof that Craniotomy may be successfully performed in contractions of one inch and three quarters; and the ex-

perience of some of the most distinguished of modern operators seems to show that this limit may be reduced to one inch and a half. We may say then confidently, that, when the conjugate diameter exceeds these limits, we are in no case justified in at once deciding in favour of the Cæsarian operation. We must once more, however, reiterate a former observation, and call attention to the fact that the conjugate measurement is not alone to be taken into account—as it is too much the fashion to do—seeing that we may have irregular or angular distortion, in which the other diameters are similarly or, it may be, chiefly distorted. And it is a point of very great interest and importance that, of the whole number of reported cases of hysterotomy, a large majority were due to osteomalacia, in which, as we have seen, the typical distortion does not necessarily involve the conjugate diameter at all. A much smaller number were cases of rickets; and, among the rarer conditions calling for the operation, may be mentioned exostosis, fracture of the pelvis, spondylolysthesis, fibrous or other tumours, and carcinoma of the os and cervix. What we wish, therefore, more particularly to notice is that the conjugate measurement cannot be accepted as *the* test of the necessity which may be assumed to exist for the performance of this operation.

Maternal Mortality.—The maternal mortality in this country has been so great—not less than 85 per cent. of all recorded cases—that a very general idea prevails that this is almost exclusively a child's operation. This is a double error; for, when we perform the operation, in a case where we know that the child cannot be otherwise born, we give the mother the chance, small though it be, of recovering from the effects of the operation, while otherwise we must leave her to die; and, as regards the child, the results are far from being so favourable as to warrant us in looking upon it as a child's operation, although it may, no doubt, fairly be inferred that this is attributable in some degree to the fact that the operation is often delayed too long.

If we turn for a moment from British to Continental statistics, it must be admitted that the results are somewhat more favourable in the latter case. The reason of this is obvious, and has its origin, directly or indirectly, in the greater regard for fœtal life which, on religious grounds, causes hysterotomy to be looked upon with more favour than embryotomy. Dubois says, for example, that when the brim is contracted to two inches, and the child is living, we should choose the former operation without hesitation. His authority, therefore, and that of others of equal distinction, has necessarily led to the performance of hysterotomy in a larger proportion of cases than has ever obtained in this country. Moreover, the very anxiety to save the

child leads to the performance of the operation at a much earlier period of labour than is practised in this country, and we cannot doubt that it is this which brings about their successful results. It is, indeed, of vital importance that the operation should not be delayed until symptoms of exhaustion have set in, as has been too often the case in England, although we operate, primarily at least, in the interests of the mother, and with a mere secondary consideration for the life of the child. It is difficult to avoid the conclusion—in which we have the support of Cazeaux—that the operation is rashly undertaken, by many of our Continental brethren, in cases where the proper operation is embryotomy. If we admit the religious element into the question, our difficulties are inevitably increased. Or, should we give force to such considerations as are suggested by Denman—that we should gravely consider, whether, in the case of a woman who, knowing that she cannot bear a living child, has allowed herself to become pregnant, we should not act rather in the interests of the child—or, in other words, if we weigh the life of the child as of equal importance in any case with that of the mother, we shall speedily become bewildered in the mazes of casuistry, and may be led to do what is morally wrong. In a word, hysterotomy is no exception to the general rule that we should act *primarily* in the interests of the mother.

After Death of the Mother.—When the operation is called for by the death of the mother, either before or during labour, there are no considerations which can encourage a moment's hesitation or delay. During labour, it may be possible to turn and deliver, or to extract by the forceps, almost as rapidly as to remove the child through the abdominal walls, and this proceeding has the advantage of being less repugnant to the feelings of relatives and friends; but, if the os is not sufficiently dilated, or if labour has not commenced, we have no choice in the matter, the only rule being to extract the child without unnecessary delay. The period during which the vitality of the child may be preserved is probably very limited. Authentic cases are recorded in which the child has been removed alive ten, fifteen, and even thirty minutes after the death of the mother; but we must treat as fables those instances of which we read, where it is said to have been found alive ten, fifteen, or twenty-four hours after the mother had ceased to live. In death before the seventh month, it would be a manifest impropriety to operate; but religious convictions have caused this to be done in order that the child may have the benefit of Christian baptism.

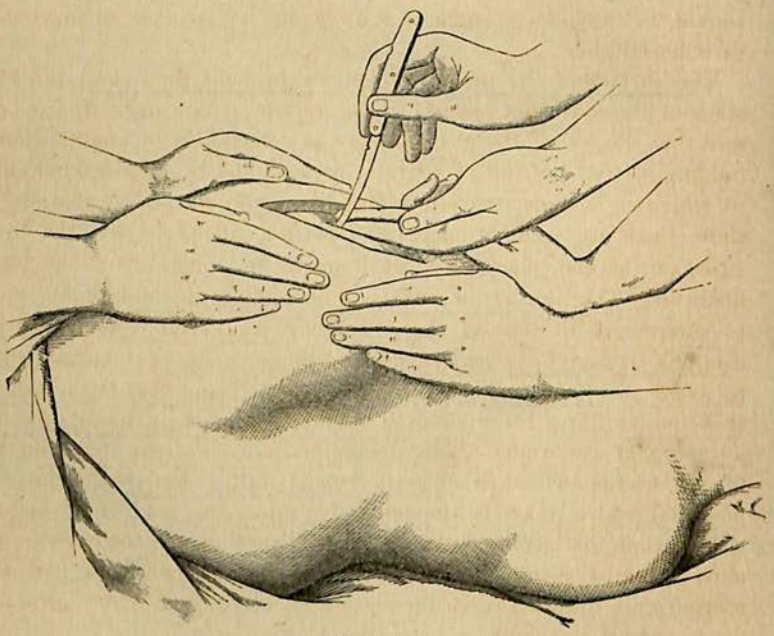
To Save the Mother.—The Cæsarian operation is, however, under certain circumstances, imperatively demanded while the mother still lives. Let us see, therefore, what are the conditions upon which success

will mainly depend. The first, and perhaps the most important point, is the early recognition of the nature and extent of the obstruction. This will enable us to prepare the woman, in some degree, for the great peril to which she is about to be subjected, by careful attention to the bowels and so forth. It is a matter of doubt, whether we should wait for the coming on of labour, or induce it artificially. There are arguments in favour of both modes of procedure, but perhaps the safest plan will be to wait until nature gives evidence that she is about to call upon the uterus to assume its physiological action, which will be an assistance to the operator at certain stages; and, besides, we are entitled to assume that, at the full time, the healing process is more likely to be encouraged by the normal physiological phenomena of involution. Under no circumstances should we operate until the os has opened to some extent, so as to permit of the discharges passing by the normal channel; but, if it be thought advisable to precipitate matters, this can always be done by some of the ordinary modes of procedure for bringing on premature labour. Winckel says that the most favourable period for the operation is the end of the first stage, and here commends that we should not rupture the membranes, as some have done, with the view of permitting the escape of the liquor amnii.

The Operation.—The measures to be taken before commencing the operation should be those which the most experienced of our ovariotomists have found, of late years, to be conducive to success. The patient should be placed upon a high bed or table, in a good light, with her shoulders a little elevated. The temperature of the room should, if necessary, be artificially raised. The operation should be performed under the carbolic spray, with otherwise scrupulous attention to the details of antiseptic surgery, precisely as in a case of modern ovariotomy. There should be at hand an abundant supply of hot and cold water, and a sufficiency of towels and sponges. Several bistouries, with sharp and blunt points, artery forceps, ligatures of various kinds, bandages, carbolized dressings and a long probang, will, with the usual minor instruments of an ordinary pocket-case, be all that is necessary. The propriety of giving anæsthetics in this operation has been called in question, chiefly on account of the disastrous effect which an attack of retching might have at a critical moment of the procedure; but, if the stomach is empty before these agents are administered, this risk is not likely to be great. The operator, standing in front of the patient, and having ascertained that the bladder is empty, must first examine the abdominal walls, in order to ascertain with precision the position of the uterus with reference to them. A final examination, *per vaginam*, should also be made, as some cases of osteomalacia have been recorded

in which the bones of an extremely distorted pelvis have yielded so much as to admit of the passage of the hand. The primary incision is to be made in the middle line, and should extend from a little below the umbilicus to about two and a half inches above the pubic symphysis. Further than this it would be imprudent to go in the latter direction, and, in the case of extreme deformity or unusual shortness of stature rendering necessary a larger incision than can be effected by this rule, the wound should be commenced above, and a little to the left of the umbilicus. The knife should be carried through the skin and

Fig. 200



Hysterotomy.

subcutaneous cellular tissue, and the various aponeurotic layers successively divided, until the peritoneum is reached. Any bleeding vessels should be carefully secured before going further.

The uterus having been previously adjusted, so as to bring its axis as nearly as may be into parallelism with the abdominal incision, the hands of two assistants are now to be placed above and below, with the view of bringing the uterine and abdominal walls into close apposition, and thus maintaining their relative positions until the operation has been completed. The section of the peritoneum should be effected with

caution, not only with the view of protecting the subjacent uterine tissue, but also to avert the possibility of wounding the bowel, as cases have been known in which convolutions of the small intestine were lodged in front of the uterus. When the peritoneal cavity has been opened in this manner, the operator should introduce, through the first minute incision, a director, upon which he may cut; or having made an aperture sufficient to admit of the passage of the forefinger, that may be advantageously used as a director, along the palmar surface of which a blunt pointed bistoury may be passed. During the whole of this process, the attention of the assistants should be sustained, so as to prevent the possibility of protrusion of the bowels, while any discharge should be assiduously removed by means of sponges wrung out of carbolic solution.

The surface of the uterus being now brought into view, the next stage of the operation consists in the section of its walls. It has been said that the site of the placenta may be determined by auscultation, a bulging of that portion of the uterine wall, and by certain other signs to which it is unnecessary to refer; but we do not believe that any of these signs are such as may be depended upon, so that the exact situation of the placenta must remain, in some degree at least, doubtful. The uterine incision is to be made in the middle line, so as to correspond to that in the abdominal walls, and is to be carried cautiously through the peritoneum and proper tissue of the organ, so as to avoid the fundus and cervix; the reason being that the section of the circular fibres there situated would be extremely likely to cause a gaping of the wound. As the knife approaches the inner surface of the uterus, we must exercise some caution lest we injure the placenta, which may be immediately subjacent; and if it should chance that this structure intervenes between us and the embryo, we must carefully insinuate the fingers between the placenta and the uterine wall, until we reach the margin of the former, before attempting to extract the child.

If—as is usually considered a favourable condition at this stage—the membranes are intact, the escape of the liquor amnii must be guarded against at the moment of perforation. For this purpose, the aperture in the membranes should be made as minute as possible, and an assistant specially detailed for this duty should carefully receive in sponges the fluid as it escapes, so as to prevent its entrance into the cavity of the peritoneum. An orifice of sufficient size being thereupon made, the extraction of the child is to be effected with the least possible delay, the feet being seized, and delivery promptly completed. While this is being done, a certain amount of uterine contraction will usually

occur, which is an additional reason for speedy action on our part; otherwise, the breach in the uterine walls will become rapidly diminished in size. It has not unfrequently happened that, when the body of the child has been successfully extracted, the contraction has been so rapid as to cause the neck to be so firmly grasped as to prevent the completion of the operation, a state of matters in which it is better to enlarge the incision, than to use force, by which we can only succeed by tearing open the wound.

If the placenta is not at once detached, the hand should be immediately introduced into the cavity, and the organ separated from its attachments, and extracted as the hand is being withdrawn. The chief risk of the operation at this stage is, of course, the hæmorrhage which necessarily occurs from the uterine sinuses which have been cut through, as well as from the inner surface of that portion of the organ from which the placenta has been separated. The former is the source from which bleeding is chiefly to be looked for; but experience has shown that this risk is very much less than might have been anticipated, the actual amount of discharge depending, in a great measure, on the efficiency of the uterine contractions; and it is certain that, fatal as the operation is in its results, death rarely ensues from hæmorrhage. The greatest care on the part of the assistants is necessary, in order to prevent the entrance of the blood and other discharges into the cavity of the peritoneum, and the escape from it of the intestines. Perfect success in this direction is, of course, impracticable; but we may be sure that the less the quantity of such discharges that comes in contact with the peritoneal membrane, the less likely is the dreaded peritonitis to be severe or fatal in its character. The use of antiseptic precautions, as regards the fingers, instruments, sponges, and otherwise, will further reduce this risk. The escape of the intestines may be prevented, and the approximation of the uterine and abdominal walls efficiently maintained, by an expedient which was suggested by Winckel. This consists in having the extremities of the uterine wound hooked upwards by the finger, and thus brought into contact with the walls of the abdomen, a manœuvre which is peculiarly applicable to cases in which the number of assistants is deficient. The probang should finally be passed downwards through the os uteri to the vagina, which ensures for the discharges free egress by the normal channel.

Closure of the Wound.—Delivery having been by these means effected, the mode of closure and general management of the incisions, uterine and abdominal, is the subject which next engages our attention. When the uterus has well contracted (a process which is materially hastened by pressure of the organ, and even by the application of

cold), when all bleeding has ceased, and when the discharges have been wiped away as thoroughly as possible, the edges of the wounds are to be brought into apposition. It is a matter of dispute whether we should or should not stitch the uterine wound. It is quite certain that this is not essential to success, and it is doubtful, as may be inferred from the experience of Winckel, whether or not it is in any way beneficial. Still, on ordinary surgical principles, and recognising the fact that, in a certain number of fatal cases, the wound has been found gaping after death, we cannot wonder that most operators seek in this way to promote union of the uterine tissues. But for one circumstance, the most advantageous procedure would be to bring the uterine and abdominal wounds into close apposition by the same suture; but the circumstance in question is a most important one, and depends upon the contractility and natural involution of the uterine tissue, which would probably involve forcible dragging upon the wound. To effect closure of the uterine incision by means of suture, while the risk referred to is at the same time avoided, has been, therefore, the great object of many of those who have had occasion to perform the operation. Mr. Spencer Wells, however, in a case in which he performed it with a successful result, passed an uninterrupted silk suture, the end of which he brought through the vagina, and subsequently removed. The usual procedure is to employ the ordinary interrupted suture in such a way as to bring the peritoneal margins into accurate apposition. It is essential to bear in mind the peculiar physiological conditions under which the uterine tissues go through the rapid changes which are involved in the process of involution, and, as one of these peculiarities is a remarkable friability, drawing the ligature too tightly has been found to cut rapidly through the tissues embraced, and thus ultimately to permit of gaping of the wound.

Whether or not the uterine wound is stitched, that in the abdominal wall is, of course, to be carefully closed by suture. The material to which a preference is usually given is fine silver wire, of which five or six stitches are to be passed through the cutaneous and peritoneal margins of the incision; and, after these have been carefully adjusted, they are to be drawn tight and fastened in the usual way, additional superficial sutures being, if necessary, added, so as to bring the whole length of the superficial incision into accurate apposition. The carbolized cat-gut suggested by Sir Joseph Lister may be substituted, in part at least, for the silver wire, and prepared gauze or other antiseptic dressings may now be applied.

After-Treatment.—A full opiate should now be administered, either by enema or suppository, and perfect quiet and rest enjoined,

the dressings being undisturbed for five or six days. The sutures are to be removed about the eighth day. The vagina may be washed out by injections of weak carbolic solution, and the bladder emptied by means of the catheter twice a day; and, on the fourth or fifth day, the bowels may be relieved by a simple enema. The diet throughout should be of the lightest possible character, and every conceivable disturbing element, bodily or mental, should be scrupulously avoided.

Reference has already been made to the operation of ovariotomy. It must not, however, be supposed that we have any idea of tracing the analogy which exists between the two operations. Hysterotomy, indeed, involves conditions which are manifestly far less favourable than those which attend on an ordinary case of ovariotomy, and we need not wonder that the results are less successful. We cannot, however, avoid the reflection that, not many years ago, the latter operation was looked upon as scarcely more promising in its results than that which we are now considering; and, when we reflect further upon the wonderful improvements which modern surgical skill has effected in the one operation, we are surely justified in expressing a hope that the experience thus gained may be so made available as materially to reduce, in the future, the fearful mortality which, in the past, has attended the Cæsarian Section. Upon nothing will the result be more likely to depend than upon the period at which the operation is performed. If, as has too generally been the case in this country, it is adopted only as a last resource, when the vital powers are exhausted by lingering labour, the expedient is, indeed, a desperate one. But if, on the contrary, the necessity is recognised at a period sufficiently early to enable us to select the time and the conditions which are most favourable, our prognosis will admit of something more of hope.

The shock of the operation is often very great, and may prove fatal at once, before the secondary effects of peritoneal inflammation have manifested themselves. Hæmorrhage is, as we have said, and as the experience of Winckel has shown, by no means a prominent cause of the fatal result; but it is otherwise with peritonitis, which is greatly to be dreaded when the woman survives the immediate effects of the operation. This may come on within twenty-four hours, and is indicated by the occurrence of rigor, severe abdominal pain, with more or less tenderness on pressure, laboured respiration, flatulent distension of the bowels, and a rapid, wiry pulse. These alarming symptoms may be combated by fomentations or poultices to the abdomen, mild salines, and opium; but, unfortunately, in the great

majority of cases, the symptoms will go on unchecked until, under their influence, the patient succumbs.

Application of Cold.—Metz of Aix-la-Chapelle, insists upon the importance of the sustained use of cold in averting peritoneal inflammation. The rash employment of this agent would, undoubtedly, as every one knows, rather tend, by reaction, to produce inflammation than to repress it; but of this Metz was quite aware. He recommends that, so soon as the woman has been put to bed after the operation, compresses of cold water should be placed over the abdomen, and that, after a few hours, ice in a bladder should be substituted, while cold injections are thrown into the rectum, and the patient is encouraged to swallow, from time to time, morsels of ice. Under such treatment, he says, the patient is sensible of a feeling of comfort to which she was previously a stranger, and this sensation may be fully trusted to as a safe guide to the length of time, and the extent to which this mode of treatment may be safely carried. So long, then, as the woman remains comfortable, cold may be employed, but the moment she complains of chill or discomfort, the cold is at once to be modified or withdrawn. Cazeaux seems to give a general support to this mode of treatment, which has also been practised by Kilian, and Dr. Metz asserts that, of thirteen cases treated on this principle one only died. While one can scarcely refrain from looking upon statistical results so specially favourable with something of suspicion, there is one fact which has of late been absolutely demonstrated, that the results of private practice are immensely more favourable than those of hospital experience, and that in the case of those who have had much experience of the operation in country districts, the recorded results have sometimes shown a success not far short of that claimed by Metz.

Porro's Operation.—The operation now familiarly known under this name involves an idea which, from a speculative point of view, is no novelty. Its practicability was so far demonstrated by Blundel by experiments upon animals, and at a still earlier period, about 1770, Cavalini obtained in the same manner almost identical results. It would appear, however, that the first operation on a living woman was performed, although with a fatal issue, by Dr. Storer of Boston. In 1876, Porro of Pavia, having previously operated on animals with complete success, reported the first successful case, in which, with a rachitic pelvis of one inch and half in the conjugate, he had the satisfaction, by this novel procedure, of saving the lives both of mother and child. Since then, the operation has borne his name, and, according to Dr. Harris, up till June 1881, of seventy-one reported cases, thirty have ended in the recovery of the mother, and forty-one in death.

The operation consists in the removal, after abdominal section, of the greater part of the uterus along with the ovaries. The main dangers of the Cæsarian Section—gaping of the uterine wound and escape of irritant and possibly septic matters into the peritoneal cavity—are by this modification of hysterotomy practically avoided; and of it may be said, as Lusk well puts it, that "its chief merit lies in the fact that each step in the operation is capable of human control, and is capable, therefore, of human improvement." The first steps are identical with those of the Cæsarian operation, including the extraction of the child and the placenta. The emptied organ is then lifted out and secured, by a *serre-nœud*, or by some modification of or substitute for it, just above the os internum. A degree of constriction being effected sufficient to arrest hæmorrhage and maintain a firm grasp, the body of the uterus is cut away along with the ovaries, and the stump brought outside. It would appear that all attempts to drop the stump into the peritoneal cavity, as has been done so successfully in the case of the pedicle of ovarian tumours, have hitherto proved fatal. Several modifications of the operation by Freund, Müller, and others, have been suggested, that of Müller being to make a large abdominal wound with the view of lifting the gravid womb out of the abdomen, and to secure the cervix by the wire écraseur or the Esmarch bandage prior to opening the cavity and removing the child. The advantage claimed for this modification is that it reduces the risk of hæmorrhage and the entrance of amnionic fluid into the abdominal cavity to a minimum, and in point of fact makes it, with ordinary care, an impossibility. Some have, however, found that the difficulty, and indeed the risk, of making an abdominal incision of a size sufficient for this is far from being inconsiderable, so that, as matters now stand, Porro's procedure still holds its own. There is absolutely no limit to the modifications which have been suggested for securing the stump and maintaining it in position, but no special detail need be given of these, seeing that most of them are already familiar to the ovariotomist. A special advantage in Porro's, as compared with the old operation, is that it involves protection from the risk of future impregnation.

Gastro-Elytrotomy.—The operation of Gastro-Elytrotomy or Laparo-Elytrotomy, which was originally suggested some sixty years ago, has recently attracted attention as a possible substitute for hysterotomy, and several successful cases have been reported in America by Professor Thomas of New York, and Dr. Skene of Brooklyn.[1] In this country it has been twice performed, in both instances unsuccessfully. The main object of the

[1] See American Journal of Obstetrics, vols. iii. and x.

operation is to avoid opening the cavity of the peritoneum, while at the same time the necessity of incising the uterine tissue is obviated. To effect this, an incision is made in the line of the groove from the symphysis pubis to the anterior-superior spinous process of the ilium. After the superficial structures have been divided and the peritoneum exposed, the latter is carefully raised from its feeble attachments until the vagina is reached and opened. The bladder must be previously emptied, and carefully kept out of the way by a sound, during the operation, as experience has shown that injury to that viscus is one of the special dangers of the operation. The os and cervix—already considerably dilated either by operation or by natural labour pains—are then hooked into the wound, and the operator, introducing his hand, delivers by turning, the child being extracted through the wound in the abdominal parietes. It is abundantly clear that this operation was suggested by that for the ligature of the external iliac artery, without opening the peritoneum, which attracted so much attention in the early part of this century, and there can be no doubt that reasoning on this analogy led Ritgen and the younger Baudelocque to perform the earlier operations. These were unsuccessful in their results, but the theoretical advantages of the procedure were so obvious, that the operation was recognised from time to time by various writers; but the credit of the first successful operation, in which both mother and child were saved, is due to Dr. Skene, since when both he and others have reported cases equally successful. Experience has disclosed the fact that two difficulties have specially to be provided against in the course of the operation. One of these is, as already mentioned, the danger of wounding the bladder, and the other is the danger of hæmorrhage from the cut vessels of the vagina. This latter danger may be to a great extent avoided by using the thermo-cautery, or by cutting down upon a wooden plug in the vagina and substituting tearing for cutting as far as possible. Before definitely pronouncing an opinion with reference to Gastro-Elytrotomy, as compared with the Cæsarian Section and Porro's Operation, it is necessary to await the results of a somewhat wider experience; but there are certainly, in the present state of the matter, no valid grounds to debar us from anticipating in this a possibly important addition to the operative resources of our art.

It sometimes happens, as a result of the healing process, that the uterine and abdominal wounds become agglutinated, so as to produce permanent adhesion at this place, without, as would appear, entailing any serious inconvenience. This fact is made use of by those who advocate the stitching together of the two wounds, and there has been

proved to exist, in some of those cases in which the Cæsarian Section has been repeatedly performed, an extent of adhesion which has admitted of the performance of the operation without opening the peritoneal cavity; and it is obviously to this fact that the exceptional success attendant on such operations is to be attributed.

Gastrotomy and Laparotomy are operations which have already been alluded to as applicable to cases in which the child has escaped into the abdominal cavity, either from a ruptured uterus, or in cases of extra-uterine pregnancy. Some of the older cases which have been recorded as Cæsarian Section have clearly been of this nature—the operation being, as is obvious, only one stage of the more formidable procedure. There may, possibly, be cases, moreover, as has already been shown, in which, although the cyst of an extra-uterine conception has not been ruptured, it is necessary to perform this operation when the life of the mother is threatened by pressure on important organs, and also under some other circumstances of a like nature. The operation is simply the first stage of the Cæsarian Section, and it is to be conducted with precisely the same precautions; but an aperture must be left at the lower part of the external wound, to permit of the escape of the discharges by a drainage tube or otherwise. It might naturally be inferred that an operation, which does not involve the uterine walls, would be attended with much more favourable results. In practice, however, we shall probably, when we take the whole circumstances into consideration, look upon the one with as great apprehension as the other. The operation of Gastrotomy has, in fact, certain special dangers in the practice of midwifery, and is very different in all respects from the ordinary operation for the removal of an ovarian cyst. The conditions which attend rupture of the uterus, or of an extra-uterine cyst, have already been detailed, when those accidents were under consideration. In each case, the ovum, its appendages, and the liquor in which it floats, all escape into the peritoneal cavity, along with a large quantity of fluid and clotted blood—a portion of which must necessarily be left behind—so that the chances of peritonitis are probably not less in the one case than in the other. And, in the case of extra-uterine pregnancy, the peculiar anatomical conditions which are often involved in the nature of the placental attachment, are of such a nature as to render these cases specially hazardous. In fact, whatever statistics may seem to prove, and Kilian and a few others may have said, we must always look upon this operation as one of the last resources of our art. When the incision is made in the flank, the operation is termed Laparotomy.

Vaginal Cæsarian Section.—When the child is extracted by

means of incision, practised from the vagina, the operation has by some been thus termed, a designation which is obviously improper. The circumstances which may render necessary such an operation as this, are:—Malignant disease of the os and cervix, congenital occlusion of the os, or retroversion of a gravid uterus. Similar operations, not involving the tissues of the uterus, may be practised in some rare instances of extra-uterine pregnancy, in which the fœtus may be reached in this way; but, in all these cases, the operation is simple, and requires no special directions other than to use bistouries and other instruments so guarded as to incur no risk of wounding the surrounding tissues, and, at the same time, to cut with care, so as to avoid inflicting any injury upon the child.

Symphysiotomy.—In 1768, Sigault, a young student of medicine at Paris, submitted to the Académie de Chirurgie a proposition that women might be delivered without very great risk by means of an operation which he thus named. The proposal was received with ridicule, and the essayist was treated as a madman. Nothing daunted, however, by this rebuff, the young Sigault stoutly maintained his position for several years, but it was not till 1777 that he performed his first operation in the presence, and with the assistance of the celebrated Leroy, who, having espoused his cause, ultimately became a warm advocate of the new procedure. Both mother and child were saved in this case, and Sigault soon found himself famous and overwhelmed with benefits, as the discoverer of a method which was to replace the hated Cæsarian Section, and, consequently, as a benefactor of his race. The Académie de Médicine, as if to atone for the indignity which the sister society had put upon him, received him with open arms, and actually struck a medal in honour of the event. In France and Germany the profession was much divided on the subject, but in England it somehow never gained a footing, nor would we even now have given any attention to the matter, were it not that, in all modern Continental works on obstetrics, some degree of prominence is still given to the operation, as one which might, under certain circumstances, be advantageously performed.

The division of the pubic symphysis is, from a surgical point of view, a matter so simple, that it is unnecessary to particularize the details. It is proper, however, that in expressing as we now do the opinion that the operation is one which must be unhesitatingly and absolutely rejected as irrational, some reason should be adduced for a view which is so confidently expressed. To begin, then, symphysiotomy is to be rejected as a mere chimerical idea, which had its origin in views as to the movement of the pelvic bones during labour, than which nothing,

theoretically or practically, could be more incorrect. It was shown, in an early chapter of this work, that the very trifling movement which nature permits during labour in the human pelvis is one in which the symphysis pubis is the hinge. At the time when Sigault wrote, the idea usually entertained was exactly the opposite—viz., that the hinge was at the sacro-iliac synchondrosis, and that the pelvis gaped at the symphysis; and it could only, of course, have been with the object of encouraging such a movement as this, that the operation could on rational grounds be supported. Again, such an obstruction as might seem to call either for Craniotomy, the Cæsarian Section, or this new operation, would, in a considerable majority of all cases, consist mainly in contraction of the conjugate diameter of the brim; but a moment's reflection will serve to show that this operation is not one which is likely to increase the diameter thus encroached upon, for, while it certainly will augment the circumferential measurement of the pelvis, and the transverse and oblique diameters, it leaves the conjugate comparatively untouched. And, if we turn to the results of the operation, we will at once find that the boasted advantage has no existence, save in the imagination of the inventor. Baudelocque says that, in forty-one cases of the operation, fourteen women died, while only thirteen children were born alive. The narrative of recorded cases shows that, while the forces of nature *may* prevail after the operation, it will often be found necessary to apply the forceps, or turn, after the original operation has been completed. As regards ultimate results, Cazeaux says, "In the most fortunate cases, the consolidation of the symphysis is only complete after a lapse of three or four months. Women have been seen in whom it had never taken place, and who, nevertheless, have eventually been able to walk. There then forms, according to Alphonse Leroy, a fibro-cellular tissue which, filling up the gap in the symphysis, maintains the solidity of the articulation."

Pubiotomy.—Various modifications of the operation have been suggested, including one method which has received the support of Stoltz of Strassburg, and which he termed Pubiotomy. In this case the operation is performed by a chain saw, which is introduced subcutaneously. A small opening is first made to the right or left of the middle line over the pelvic crest, and through this a strong needle, slightly curved, is introduced. This is passed behind the pubes, and brought out by the side of the clitoris, and by it the chain saw, to which it has previously been attached, is pulled through, and made to act upon the body of the pubis from within outwards, until the bone has been divided. The operation of symphysiotomy has been but once practised, in so far as we are aware, in this country; and on the

Continent, in the present day, it is so seldom employed that the question may now be looked upon as forming little more than an episode in the history of the operative midwifery of the past.

It may be interesting at this place, by way of recapitulation—but without any pretence of, or attempt at, anything more than an approximation at accuracy—to set down, in a tabular form, the various conjugate measurements at the brim which, according to the best authorities, may be supposed to indicate the necessity for the several operations which we have now been considering. Burns, speaking of one of the operations referred to, says—and the observation will apply with equal force to any of them,—"There is only one degree of disproportion, then, betwixt the head and the pelvis which will admit of this; but the smallest deviation from it destroys the advantage of the operation. Now, as this disproportion is so nice, we cannot in practice ascertain it; for, although we could determine, within a hundredth part of an inch, the capacity of the pelvis, yet we cannot determine the precise dimensions of the head, and thus establish the relation of the two." The student, we would again repeat—at the risk of being accused of unnecessary iteration—must, above all things, beware of assuming that conjugate contraction is his only guide, or one which is uniformly to be relied upon. The following figures, therefore, have reference only to cases of conjugate contraction, in which the other diameters are either unaltered, or are, at least, not very greatly diminished. With reference, more particularly, to the Cæsarian Section, in which osteomalacia is the most frequent cause of deformity, it should be remembered that, in that type of pelvis, the conjugate measurement, so far from being a criterion of the deformity, is more likely to lead the observer to conclusions which are quite erroneous.

With this explanation, then, the following may be given, as showing, according to the most approved authorities, the degree of conjugate contraction at the brim, which may be supposed, under ordinary circumstances, to indicate the various operations which have been described:

Long Forceps, ...	4 to 3¼ inches.
Turning, ...	3½ to 2¾ „
Craniotomy, ...	3 to 1½ „
Cæsarian Section, or its substitutes, .	1½ and under.

CHAPTER XXXIV.

INDUCTION OF PREMATURE LABOUR.

History of the Subject.—Nature and Scope of the Operation.—Viability, or Non-Viability of the Child.—Conditions justifying Operation.—Various Methods of Provoking Uterine Action: 1 Ergot 2 Puncturing the Membranes: 3 Separation of the Membranes by Hamilton's Method: 4 Dilatation of the Cervix by Tents: 5 Introduction of an Elastic Bougie or Catheter into the Uterus: 6 Plugging or 7 Distending the Vagina: 8 The Method of Kiwisch by the Vaginal Douche: 9 Cohen's Method by Intra-Uterine Injections 10 Barnes' Process, consisting of a "Provocative" and an "Accelerative" Stage: 11 Galvanism 12 Irritation of the Breasts.—Anatomical and Physiological Fitness of the Parts.—Constitutional Influences.

It is with something of a sense of relief that we turn from a consideration of the destructive operations of midwifery, to what is perhaps, in the strictest and truest sense, the most conservative of all the resources of our art. There is a fitness, moreover, in considering the subject at this place, as it affords, within certain limits, a means by which the necessity for the more serious operations may be avoided.

Of all methods of operative procedure which are applicable to the practice of obstetrics, there is none which has given rise to such prolonged and often acrimonious discussion. Putting aside various expedients which were occasionally adopted both in ancient and modern times to expedite delivery, there can be no doubt that the induction of premature labour is an operation which we owe to the sound judgment of the English school of midwifery, by the sheer force of which, and the vigorous support it received from many influential quarters, the operation was soon forced into notice. In 1756, a conference was held in London, which was attended by the most eminent practitioners of the day, at which this question was fully and exhaustively considered in all its bearings, with the result of formally admitting it as a recognised practice of the English school.

For reasons which have already been more than once adverted to, the induction of premature labour was not likely to obtain a ready assent on the Continent, where, on the contrary, it found opponents who were so virulent in their hostility, that an operation, which is perhaps above all others morally right, as well as beneficent in its action, was for many long years contemptuously rejected. The great force of truth, however, ultimately prevailed, and the operation was performed in Germany by Wenzel in 1804; but it was not till 1831 that Stoltz of Strassburg led the way by performing the first operation in France—not the least of the benefits which this distinguished obstetrician conferred upon that branch of science with which his name is honourably connected. From this moment, the success of the operation was assured, even in the country where it had been longest resisted. Sentimental scruples in regard to fœtal life, which had swayed the opinion of many, were shown to be in this case quite irrational, and could be supported by no argument, moral or religious, the sophistry of which could not easily be exposed. As time wore on, all doubt vanished, and it may now be said that, in the present day, the practice of the Continent is as advanced as it is in England, and perhaps of late years the operation has attracted even more attention than with us. The only remnant of the original prejudices, which still exists in the minds of some, is the opinion, occasionally entertained, that we should not perform the operation repeatedly upon the same woman, on the principle which has induced those persons to bring the interests of the child into greater prominence in the case of a woman who has once been delivered by craniotomy, and who ought, therefore, according to them, to be exposed to the fearful danger of the Cæsarian Section, in order that the infant may be born alive.

Viability of the Child.—The induction of Premature Labour, in its widest sense, is an operation varying greatly in its details, whereby the uterus is artificially stimulated to expel its contents at any period prior to the completion of the full term of utero-gestation. The merest glance at the subject will therefore suffice to show that the operator must feel the sense of responsibility more, the earlier the period of pregnancy at which the presumed necessity for the operation may arise. At the sixth, and at the ninth month, the operation will differ in no essential particular, and may be attended with equally trifling risk to the mother. But, in the one case, we sacrifice a child, by bringing it into the world before it is viable, while, in the other, we merely induce the premature explusion of an infant which there is every reason to suppose may survive; so that we must carefully draw a distinction between the induction of *abortion*,

and of premature labour in its more restricted sense. The general opinion, which has found expression in the "Code Napoléon," is that the end of the sixth month is the period at which the fœtus may be considered viable; but the experience of all accoucheurs extends this till about the twenty-ninth week—before which time, indeed, we have but little hope that the child may be reared. It is clear, therefore, that if the cause calling for the induction of premature labour is of such a nature as to warrant us in deferring the operation until the end of the seventh month has been reached, we should do so, avoiding, at the same time, the risk of over-caution, which, by delaying too long, may leave the mother exposed to the dangers from which it is our primary object to save her.

Conditions justifying Operation.—The conditions under which we may be justified in performing the operation vary considerably. When we operate before the middle of the seventh month, we may look upon our procedure as one which we undertake in the interests of the mother alone, without any reference to the child, which is thus deliberately sacrificed. While it is true that these are the cases in which a sense of responsibility is most likely to weigh upon us, there are instances, undoubtedly, in which delay involves a responsibility more serious still, in leaving the case to nature, when the sole alternative of the Cæsarian Section will almost surely result in the sacrifice of the mother, and probably also of the child. There is another class of cases which have been alluded to in a previous chapter—in which we are sometimes, though very rarely, warranted in inducing abortion. The most familiar example of this is found in the excessive vomiting which occasionally attends pregnancy, so as to bring women previously healthy to the very verge of dissolution. We have great difficulty in admitting this as a cause justifying abortion, and most certainly no young practitioner should have recourse to the operation, without very careful consideration, and, if possible, the advice and assistance of some one more experienced than himself. For, if disaster does occur—and we cannot doubt, from cases given by Tyler Smith and others, that it occasionally does so—from delay, we cannot but fear that a too great familiarity, under such circumstances, with an operation which is in itself simple enough, may result in a wanton sacrifice of fœtal life. Nature, as we have already shown, almost invariably comes to the relief of such cases, so that the circumstances which might warrant the operation are extremely rare.

There are instances again, in which, at a more advanced period of pregnancy, the operation is undertaken in the interests of the child. There are few practitioners of much experience, who have not encoun-

tered cases in which women, often apparently robust, have been, on successive occasions, delivered of still-born children near the full time. In such, we should not hesitate to bring on labour before the time at which the death of the fœtus was presumed to have occurred in former pregnancies, fixing the period as near the natural termination of the pregnancy as may be deemed prudent. The causes which give rise to the death of the fœtus, in these cases, are often obscure, and sometimes can by no means be distinguished; but in most instances there is, as we may assume from what has actually been demonstrated, some diseased condition, which interrupts the placental circulation, and thus causes the death of the child. Any of the diseased conditions of the placenta formerly enumerated—such, for example, as fatty degeneration—may have this effect, and it is probably when the disease is rapidly progressive, towards the end of pregnancy, that we are able, by premature delivery, to avert its otherwise inevitable effect on the life of the child, by placing the latter in circumstances in which, aerial respiration having been established, it is independent of the placental circulation.

It is, as we have seen, a natural physiological accompaniment of pregnancy, towards its termination, that the utero-placental tissues loosen somewhat, preparatory to the occurrence of delivery; and, when no actual disease of the placenta can be discovered, it has been supposed that premature separation of the decidua may, either by rupture of the vessels, or by interference with the circulation within them, directly or indirectly destroy the fœtus. In some cases—of which we have seen two examples—it would seem as if the uterus, as in habitual abortion independent of disease, had assumed a habit of throwing off its contents at a certain time, before the conditions otherwise favourable to live birth were in operation; and yet, when this so-called habit is once broken by the induction of premature labour at a somewhat earlier period, the woman, in subsequent pregnancies, carries her children to the full time. The operation may even be warranted in cases in which, although the children may have previously been born alive, they have, owing to the occurrence of some of the diseases referred to, been the subjects of what has been termed, with some propriety, "intra-uterine marasmus," and have not long survived their birth. In cases of still-birth, a very excellent rule which has been laid down for our guidance in subsequent pregnancies is to examine with great care the placenta and membranes.

In Pelvic Contraction.—The cases which are most frequent in their occurrence, and, at the same time, most satisfactory in their results, are those in which we operate with the double object of saving both

mother and child from great peril or almost certain death. Merriman has insisted, with great justice, upon the caution which we should exercise, when the conditions which seem to indicate the necessity for premature delivery occur in primiparæ. To a great extent, this warning is sound and judicious, but we must avoid carrying the principle too far; for, if the circumstances are such as seem to preclude the possibility of the passage of a mature fœtus at the full term, we are equally justified, in primiparæ as in other cases, in having recourse to an operation which thus obviates an otherwise inevitable risk. In pluriparæ, much, and possibly everything, will depend upon the history of former labours. If, for example, it has been found necessary, once or oftener, to relieve the woman in previous labours by the operation of craniotomy, or even by turning or the long forceps, with an invariably fatal result as regards the child, the estimate which we may be inclined to form of the probable danger is thus corroborated by experience; but, where the indications are less certain, we must be thoroughly convinced that the operation gives the best chance to the child as well as to the mother, before we can hold ourselves as warranted in acting.

Inasmuch as the life of the infant will depend, in all cases, upon the degree of development which has been attained prior to birth, it is of the first importance that we should form a correct estimate of the period beyond which we cannot safely go. As the necessity for this proceeding, as well as for the more serious expedients of embryotomy and the Cæsarian Section, arises, in a very large proportion of cases, from contraction of the conjugate diameter of the brim, we should, in the first place, endeavour to ascertain, with as much accuracy as may be attainable, the precise degree of the contraction. This may be done approximately by the methods of pelvimetry which have been already detailed. It is obvious that such an amount of contraction as would call for the Cæsarian operation, will require measures for the relief of the woman to be taken at an earlier period than when the diameters are such as to point to embryotomy. In cases of conjugate contraction, as has already been shown, the head lies pretty nearly in the transverse diameter, so that it is the bi-parietal measurement which corresponds to the contracted diameter of the brim.

While estimating, therefore, the degree of pelvic contraction, it is proper that we, at the same time, bear in mind the probable measurements of the bi-parietal diameter of the cranium at various epochs in the course of the last two or three months of pregnancy. Stoltz has ventured to give measurements which, reduced to the standard of the English inch, we may quote as probably approximating the actual condition of the parts. Between the thirty-second and the thirty-

third week, the bi-parietal diameter is somewhere about two inches and three quarters; from the thirty-fourth to thirty-fifth, three inches; and from the thirty-sixth to the thirty-seventh, three inches and one third. If, therefore, we have to deal with a case in which the conjugate diameter is two inches and a half, or under, we should operate not later than the end of the seventh month, even making all allowance for the greater compressibility of which the head, at this early period, is susceptible. Conclusive proof of twin pregnancy may, as Cazeaux has shown, modify our procedure in this particular, or might even warrant us in abandoning the case to nature, if the contraction is not excessive; and this for two reasons—because twins are generally less developed, and because their organization is seldom so perfect when they are prematurely born as to enable them to maintain an independent existence.

In cases of pelvic distortion where the conjugate falls under one inch and three quarters, the only possible alternative will, in most cases, be the Cæsarian Section. A case such as this necessitates abortion, for it is only by operating in the course of the sixth month at latest, that we can expect to save our patient, by the expulsion of the fœtus before the period of viability. At whatever period the operation may be resolved upon, there is always a greater probability, which should not be lost sight of, of obstruction from malposition of the fœtus, and, the more removed the case is from the natural term of gestation, the more likely is this to occur and to constitute a practical difficulty which may not have been anticipated.

Exceptional Cases.—It must not be supposed that pelvic contractions are the sole conditions, in addition to such as have previously been mentioned, which lead to the operation we are now considering. We have already seen that, in certain cases of hæmorrhage, whether accidental or unavoidable, the only course of procedure that we can adopt is one which, by inciting the uterus to premature contraction, relieves the mother from the state of peril into which she has fallen, and, at the same time, may be the means of preserving the child. But, in addition to these, which clearly point to the operation, there are many other instances which may fairly be admitted to stand in a more doubtful category. When a woman, for example, is, towards the end of pregnancy, affected by a serious disorder which apparently places her life in immediate jeopardy, it cannot fail to be a matter of anxious consideration whether or not we are to reject the operative means which we have at our command, which will generally save the child, and may often save the mother. Here, as in all other cases, we must place the interests of the mother before those of the

child. It will not be a safe rule in practice, although it may seem so in theory, that we may operate to save the child, if we are persuaded that, by so doing, we shall not augment the danger of the mother: in fact, we should, in such cases, operate only when we can convince ourselves that the procedure is also, in the main, the one which affords the mother the best chance of her life.

Cases of this kind, under a variety of forms, occasionally occur in practice. In dropsical effusions into the great cavities, to such an extent as to interfere seriously with the function of respiration, no profound consideration is required to show that distension of the uterus is an element or unit in the mechanical causes which place the woman's life in peril, and it is at least a reasonable assumption that, by subtracting this unit from the sum-total of unfavourable conditions, we give the mother an additional chance, while we withdraw the child from the operation of causes which may materially imperil its existence. Certain cases of cardiac disease, or of aneurismal tumours, in which the pressure of the gravid uterus seems likely to precipitate a catastrophe which we may regard as ultimately inevitable, may, on similar principles, be our warrant in inducing a premature expulsion of the uterine contents; but, in the course of practice, other exigencies may offer themselves, in which, while the indications are less clear, we may yet consider ourselves justified in bringing the pregnancy to an abrupt termination.

Several years ago, we had an opportunity of seeing a case of this kind in consultation with Dr. Dobbie of Ayr. The patient was a lady aged thirty, who had been for some years the subject of chronic asthma. She was, in the eighth month of her fourth pregnancy, labouring under severe chronic bronchitis, of a cyanotic appearance, and with an extremely feeble and irregular pulse. All the ordinary means, applied with much skill and discrimination, had failed to afford any relief, and it was therefore resolved, in the apparently desperate circumstances of the case, to have recourse to the induction of premature labour. Dr. Dobbie kindly supplied me afterwards with the following details of the issue of the case:—"About eight o'clock on Friday evening I made a vaginal examination, with a view to learn the exact position of things, and, in doing so, I found the tissues all so lax and moist, and the uterus reaching so low in the pelvis—almost touching the perineum—that, without withdrawing my hand, I commenced dilating the os, first with my fore finger, and then with the fore and middle fingers. At the end of half an hour, and without any complaint of pain on the patient's part, the os was fully the size of a crown, and I left it. Pains had slightly commenced by this time, and they went on increasing, but,

throughout the labour, they were of a very moderate kind. At 10.45 P.M. labour was terminated by the birth of a living and healthy female child. We did our best to support strength by stimulating freely; but without avail. She died at 5 A.M. on Saturday."

This is a tolerably good illustration of the exceptional cases referred to. The result, as regards the mother, was only what might have been anticipated, had the symptoms detailed been observed unconnected with the pregnant state; and, if the case had been abandoned to the operation of nature, we cannot doubt that the result would have been a dead child as well as a dead mother. Furthermore, a retrospect of the case does not now modify, in any degree, the opinion which we entertained from the first, that the course resolved upon was—putting the child entirely out of consideration—that which gave the patient the benefit of the last ray of hope which remained for her. It is impossible to detail all the conditions which may be supposed to justify a similar course, but we may mention dropsy of the amnion, myomatous or other tumours, albuminuria, convulsions, and mania, as among the circumstances which have, in the experience of able practitioners, been found to call for the operation.

The Operation.—As usually practised, the induction of premature labour is a process in which operative aid plays an important, though a quite subordinate part. The *accouchement forcée* of the older French writers was a mode of procedure very different from this, and, although the opponents of the English scheme did not scruple so to designate it in their bitter hostility, no analogy between the two can, in any sense, be admitted. Various as are the methods which have been practised with a view to the expulsion of the fœtus, these, with scarcely an exception, consist, in so far as operative procedure is concerned, of expedients which are adopted with the view simply of *inducing* the uterus to expel its contents. These provocative measures are, as we shall see, very various; but, so soon as uterine action has once been thoroughly excited, the further progress of the case is usually left to nature. The different modes of inducing uterine contraction which are here referred to, were divided by Stoltz into two classes. The first of these embraces all methods which are supposed to act primarily upon the system, with the object of producing, secondarily, the effect which we desire: the second comprehends all proceedings which may be adopted, with the view of operating directly upon the ovum or uterus, and thus stimulating, by reflex action, the latter to contract.

The operation of such means as may be referred to the first class is too uncertain, and is, in fact, so little to be depended upon, that, in modern times, they have been entirely abandoned, especially in cases in

which delay is to be avoided; and there are, probably, no accoucheurs of the present day who would waste time in maintaining an expectant attitude, in the hope that baths, bleeding, emetics, or even purgatives, might possibly produce what they desire. The only agent which, acting through the medium of the circulation, has still some supporters, is the ergot of rye. That this drug acts, in a large number of instances, upon the spinal cord, so as to influence the fibres of the uterus, is a fact which no one can gainsay; but, in cases of abortion, and in all cases in which the uterus is in a state of quiesence, its action is more variable, and less to be depended upon, than when it is employed during labour. While we reject it, therefore, as a provocative agent, there seems no good reason why we may not use it in many cases—as we would in labour at the full time—to expedite delivery, or to sustain flagging uterine effort.

The other plan, that of operating upon the ovum or uterus, so as directly to excite the contraction of the latter, has entirely superseded such of the more remote and indirect modes of procedure as have by some been practised. We purpose to direct attention here to the more important only of the numerous methods which have been devised directly to effect uterine contraction.

Various Methods.—1. The original mode of procedure, which received the support of the London Congress above alluded to, consists in the Rupture of the Membranes, by means of a quill sharpened at the point, or in any other way which may be considered more safe, in order to permit of the escape of the liquor amnii, and the partial collapse of the uterus. This is a very certain and effectual method of inducing premature labour, but it was soon found to be open to serious objections. In the first place, it compromises very decidedly the chances of the child, by allowing the uterine walls to come in contact with, and injuriously press upon it, in its imperfectly developed condition, from the beginning to the end of labour. And, secondly, it is far from being free from danger, especially in cases of abortion, when, owing to the imperfect dilatation of the cervix, the membranes are difficult to reach; and many cases have occurred of serious and even fatal results, from injuries inflicted upon the cervical tissues in the course of those efforts, as has often been the case in recorded examples of criminal abortion. On these grounds, with the exception of certain cases of hæmorrhage and convulsions, in which, for special reasons, it is preferred to other methods, its use is to be condemned.

2. Separation of the Membranes, by means of the finger or sound introduced through the os uteri, was recommended and practised by Professor Hamilton of Edinburgh; but it may fairly be assumed that

the result in such cases is due as much to the irritation and forcible dilatation of the os and cervix, as to the partial separation of the membranes, which is effected by sweeping the finger or sound round the lower segment of the uterus, so as to cause their detachment. Still, as the integrity of the membranes is in this way preserved, although, in many cases it must necessarily be imperilled, this may be looked upon as an improvement upon the original process.

3. The Dilatation of the Os by tents has also been practised with considerable success, but in this case something more is attempted than a mere excitement to contraction, in the forcible dilatation of the parts, by which the natural process is in some degree aided. This latter indication is, however, more thoroughly carried out in the method suggested by Dr. Barnes, as will afterwards be more particularly explained.

4. The process which, in the opinion of most operators of the present day, is to be preferred, as combining, in the highest degree, the qualities of safety and efficiency, is the introduction within the uterus and outside of the membranes, of an Elastic Bougie or Catheter, which is passed without a stylet for six or seven inches, and is allowed to remain in position. The presence of this is resented by the uterus, and, sooner or later, the organ is stimulated to contraction, as by any other foreign body. The risk of injuring or separating the placenta, which some have urged as an objection to this process, may practically be dismissed. With a stylet, that might possibly occur; but, when the catheter is introduced properly, the resistance of the placental adhesion would, if encountered, be sufficient to turn aside the flexible stem.

5. The introduction of Foreign Bodies into the vagina has been trusted to by some as a means of inducing premature labour. It has already been remarked, in discussing the treatment of the hæmorrhage of abortion, that the great objection to the use of the plug was the danger, amounting almost to certainty, that the uterus would thereby be excited to expel its contents. As our object in the one case is to induce, what in the other we seek to avert, it may fairly be admitted that distension of the vagina, by Braun's Colpeurynter, Gariel's air pessary, or any other form of plug, is a safe method of provoking the uterus to contract, although tardy and uncertain in its action.

6. The use of Vaginal or Uterine injections was first suggested by Continental practitioners, and, as both of these methods have received no inconsiderable amount of support in this country, it is proper that we should give to them some particular consideration. The method of Vaginal injection, which is known on the Continent as that of Kiwisch, has, in this country, received the support of Tyler Smith, Churchill,

and other eminent accoucheurs. The process, as originally suggested, consists in directing a continuous stream of warm water upon the os uteri by means of a long tube, which is connected with a vessel placed several feet above the level of the patient. Some operators, trusting to the effect of the warmth of the injection, allow free egress of the fluid from the vagina, while others use measures to prevent its escape, with the view of effecting anatomical detachment of the membranes from the uterine wall, while Tyler Smith expresses a preference for the alternate use of hot and cold water, as more certain to excite uterine action. The injection is to be repeated once or twice a day, for ten minutes or a quarter of an hour, when it seldom fails to bring on contraction after eight or ten applications, and sometimes after two or three. Dr. Simpson substituted an ordinary Higginson's syringe, and various modifications of the original apparatus have, from time to time, been suggested. Simple and safe as this method may appear, later experience has shown that it is by no means free from risk, and some cases have been reported in which death has occurred; so that, if it should be employed, caution must in every case be exercised; and we apprehend that it can only be adopted with perfect confidence, as regards the safety of the patient, when nothing is done to prevent the free escape of the fluid from the vagina.

7 The intra-uterine douche, which is generally known as Cohen's method, was first recommended by Schweighäuser in 1825. It was originally introduced as an improvement upon Hamilton's process, as, in its operation, it more thoroughly and effectually separates the membranes from their uterine attachments. Abundant proof has been afforded that this is an effective plan, but it remains for our consideration whether or not it is to be admitted as a safe one. Dr. Barnes has collected no less than ten cases in which a fatal result ensued from the employment of the intra-uterine douche, in some from shock, in others, as has been assumed, from the passage of the injected fluid through the Fallopian tubes into the abdominal cavity, and in others, as in a case which he quotes from Ulrich, by the entrance of air into the circulation through the uterine sinuses. In two cases mentioned by Simpson, the cause of death was rupture of the uterus. "The occurrence," he says, "of the rupture was to be explained by the fact, that the uterus, being already fully distended, could not admit the few ounces of fluid without being stretched and fissured to some extent; and during labour these slight fissures might easily be converted into fatal ruptures. In one case, the patient died before labour was completed; in the other, in twelve hours after its termination." It has also been urged by the same authority, that the placenta may be detached by such injections;

and that the position may possibly be altered, so as to change a cranial into a transverse presentation.

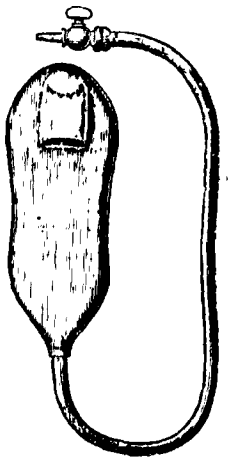
While we cannot wonder that the methods above described have received much support from influential quarters, we fear that such results as have been reported must be taken as a sufficient warrant for the absolute condemnation of the syringe as a means of inducing labour. Some doubt may be admitted as to the original plan of Kiwisch; but, when this is combined with forcible distension of the vagina, by preventing the escape of the injected fluid, which is tantamount to Cohen's method, we feel that no evidence of mere efficiency, nor accumulation of successful results, will warrant us in exposing a patient to such danger, while, undoubtedly, safer means are at our command. Injections of carbonic acid gas, and of common air, within the cavity of the uterus have also been practised, but with such results as to deter any one from such expedients in all time coming.

7. The most recent method of inducing premature labour is that which was suggested by Dr. Barnes—dilatation of the os and cervix by means of graduated fluid pressure. A similar mode of procedure had previously been attempted by Dr. Keiller and Mr. Jardine Murray; but it is to Dr. Barnes that we certainly owe the complete scheme of cervical dilatation. The plan originally propounded by Dr. Barnes commenced by forcible dilatation of the os uteri, and was one, therefore, to which the French opponents of the general scheme would have applied their favourite term "*accouchement forcée*," with the full weight of the contemptuous epithet, and to the modified procedure which he now advocates the same term might still, in a qualified sense, be applied.

His process now consists of two stages—*provocative* and *accelerative*. For the first of these, and for reasons similar to those which have been advanced in the preceding pages, he prefers the fourth of the methods which we have described. Overnight he passes an elastic bougie six or seven inches into the uterus, and coils up the remainder of the instrument in the vagina. Under favourable circumstances, some uterine action will have been set up by the following morning; and, if not, it must still be left *in situ* for a time, until it is evident that the provocative action has been established. "Before rupturing the membranes," he says, "adapt a binder to the abdomen, and let this be tightened, so as to keep the head in close apposition to the cervix. This will often prevent the cord from being washed down by the rush of liquor amnii. Dilate the cervix by the medium or large bag, until it will admit three or four fingers. Then rupture the membranes, and, before all the liquor amnii has escaped, introduce the dilator again, and expand until

the uterus is open for the passage of the child. If the presentation is natural, if there is room, and if there are pains, leave the rest to nature, watching the progress of the labour. If these conditions are not present—and one or other is very likely to be wanting—proceed with accelerative methods, that is, to the forceps or turning; or, in cases where the passage of a live child is hopeless, to craniotomy. By pursuing this method, we may predicate, with great accuracy, the term of the labour. Twenty-four hours in all—counting from the insertion of the bougie—should see the completion of the labour. The personal attendance of the physician during two hours is generally enough. The mode of proceeding must vary according to the conditions of the case." Writing in 1862, he says, "It is just as feasible to make an appointment at any distance from home to carry out at one sitting the induction of labour, as it is to cut for the stone."

Fig. 201.



Barnes' Uterine Dilators.

The fiddle-shaped bags referred to in the above extract are of the form shown in the accompanying illustration. They are so constructed as to be grasped in the middle or constricted part by the os and cervix, which prevents them from slipping upwards into the uterus, or downwards into the vagina. Their introduction is effected by means of the little cup-shaped pouch which is attached externally, into which the point of the uterine sound may be adapted, and from which it may subsequently be withdrawn. Being first thoroughly emptied and folded upon itself, the stop-cock at the end of the tube being closed, it is passed in this shape through the cervix. The nozzle of a syringe, which has previously been filled with water, is now adapted to the tube, through which the fluid is cautiously injected. After moderate dilatation of the bag, the stop-cock is again closed, and the syringe removed, when the bag will be found to be firmly fixed in its place. A little practice, as we have learned by experience, is necessary in the management of this instrument, and especially of the stop-cock, but a close observation of the apparatus, and a few test-experiments before its introduction, will obviate any difficulty, and will at the same time serve to ensure the efficiency of the bag. The process of subsequent dilatation should be gradual, and is effected by repeated injections, which, while increasing the size of the bag, exercises a pressure or dilating force upon the cervix, which is perfectly equable, and which is a pretty

close imitation of the manner in which nature effects dilatation by means of the sac of the liquor amnii. It may be necessary to use successive bags, which progressively increase in size; or, in the absence of a sufficient assortment, two bags may be simultaneously introduced, and successively dilated, until the requisite amount of distension is attained. The only objection which occurs to us, as one which may possibly be urged against the use of this contrivance, is the chance of the displacement of the presenting part, by the expansion within the uterus of the fundus of the bag; but, in so far as experience has gone, in the hands of the inventor, or of those who have adopted his process, it does not appear that this objection has been experienced in actual practice. For our part we have repeatedly had occasion to use the apparatus, and, so far as a limited experience may entitle us to form an opinion, we can, in every respect, corroborate the assertions which have been made in its favour.

The methods of inducing premature labour which have been above detailed do not, it need scarcely be said, embrace all that have been suggested and practised. At a very early period of the controversy, Galvanism was looked upon by some as an agent from which important results might be expected; but, although this is a powerful and undoubted provocative to the uterine contraction in some cases, it is so uncertain, that its use has now been abandoned, as has also been the case with regard to many other expedients, from which at one time brilliant results were looked for. Scanzoni has suggested an ingenious, but rather fanciful method, depending upon the well-known sympathy which exists between the mammæ and the uterus. He has applied—and in two cases, at least, with success—an apparatus of the nature of an exhausting syringe, or sucking-pump, over the nipple for about two hours, the irritation thus produced being propagated by sympathy to the uterus. Most of the other methods suggested are either modifications of processes already described, or are not of sufficient importance to require special consideration.

Constitutional Influences.—The condition of the ovum, the uterus, and the system generally, in reference to this operation, are obviously points of no little importance. The question of viability or non-viability of the fœtus having been determined by the period of pregnancy, the fitness, anatomically and physiologically, of the maternal parts, and, indirectly, that of the general system of the mother, naturally attract attention. In deciding upon the operation, we necessarily resolve upon a proceeding which, in a manner, takes nature unawares. The condition of the cervix at various periods of pregnancy, has been fully referred to in a previous chapter.

It is but natural, therefore, that we should anticipate difficulties, in proportion to the extent to which the case is removed from the full term of gestation. But, in practice, it is truly wonderful how nature seems to adapt herself to the exigencies of the case; for, not only do the parts yield, to an extent upon which mere speculation would not entitle us to rely, but the whole system seems to lend itself to our purpose. The breasts enlarge and milk is secreted, after the seventh month at least, and often earlier, for the sustenance of the infant, just as if pregnancy had run an uninterrupted course. The dangers of parturition may be to some extent, but, in truth, are scarcely sensibly, augmented, nor are certain after-effects of mature parturition—which have yet to be detailed —much, if at all, more likely to accrue.

This brings to a conclusion what is generally termed Operative Midwifery. The various modes of procedure which, in this and previous chapters, have been described, do not, of course, include every skilful *tour de main* which the experienced or ingenious practitioner will, under special or peculiar circumstances, adopt. The object of the author has been rather to point to general principles, than to elaborate details to which the increasing scientific accuracy of the art is daily giving precision.

CHAPTER XXXV.

LABOUR OBSTRUCTED BY MATERNAL SOFT PARTS.

Rigidity of the Os: Use of Anæsthetics and of Belladonna: Forcible Distension: Incision if Os Occluded.—Effects of Uterine Displacement.—Abnormal Conditions of the Vulva and of the Vagina: Rigidity: Persistent Hymen: Cicatrices from Sloughing: Treatment of these Conditions.—Vaginal Thrombus.—Uterine Polypus; Management of, where it obstructs Labour.—Ovarian Tumours.—Fæcal Accumulation in the Rectum: Rectocele.—Distension of the Bladder: Cystocele.—Stone in the Bladder an Occasional Impediment.—Herniæ.—Other Tumours which may impede Labour.—Malignant Disease of the Canal.

Rigidity.—In treating of the management of natural labour, various obstructions, arising from the condition of the soft parts, were necessarily alluded to. The form under which obstruction of this kind most frequently presents itself is that of rigidity, either of the os uteri or of the perineal structures. Generally speaking, this is an occurrence which exists quite independently of any diseased condition of the parts, and is, in fact, a purely functional lesion, yielding, as all experience has shown, to time, or to blood letting, anæsthetics, and the warm bath. Such obstructions as these may exist in every conceivable degree, from that which causes but a trifling delay, to the more obstinate forms, which only yield after long-continued and possibly exhausting labour. But, in addition to these, there are yet other cases in which the obstruction of the os is of a more serious nature, depending either upon peculiarity of structure or actual disease; and it is in cases of this kind, as was before mentioned, that the force of the uterine contraction has been so great as, in some rare instances, to separate the os and cervix, in the form of a ring, from the rest of the uterus, or, in some more common way, to produce rupture of the organ.

There are some cases in which there seems to be actual Occlusion of the os, such as is sometimes observed in the unimpregnated uterus.

Impregnation, in the case of an absolutely occluded os, is as impossible as that the normal function of menstruation should be carried on, and therefore, we assume, in such cases, that the closure must have taken place subsequently to the entrance of the seminal fluid. It is, of course, possible that the os may remain open to a very limited extent, and yet the state of the tissues render distension impossible, so as practically to constitute an impediment as insurmountable as actual occlusion would be. In cases of anteversion of the gravid uterus which are associated with pendulous abdomen, one result of the displacement is that the os uteri is tilted upwards and backwards beyond the reach of the finger, a condition which might readily enough be mistaken for occlusion, unless the observer should take the precaution to introduce the hand within the vagina, so as to explore thoroughly that part of it which is towards the hollow of the sacrum. Injuries, the result of former labours, the indiscriminate use of cauterants, and some other similar causes, may give rise to a species of callous rigidity, which is scarcely to be overcome by any means short of actual incision; and in the worst cases of all, in which the tissues are the seat of induration from cancerous disease, the barrier may be so impassable as to render necessary the desperate expedient of the Cæsarian Section.

Treatment of Rigid Os.—In bygone times, the treatment of simple rigidity of the os consisted in the free use of the lancet, the administration of tartar emetic, and the employment of the warm bath. That those agents have the effect, in most cases, of overcoming such rigidity is certain; but, in the present day, anæsthetics are always preferred as being safer, simpler, and equally reliable. Chloroform is usually preferred, but recent observations would seem to indicate that ether is safer, while the effect produced by chloral hydrate is no less marked. Belladonna, in the form of injection, is much extolled by the French accoucheurs, but this is an expedient which is to be resorted to with caution, as faintness, headache, vertigo, and the other constitutional effects of the drug, are apt unexpectedly to be induced. The cases, according to Cazeaux, in which belladonna is most likely to do good, are those in which there is not rigidity, but spasmodic contraction of the fibres of the neck, an active and not a passive force. Although the os may, in ordinary cases, with scarcely an exception, be readily detected by the finger, it would appear that there are instances in which, although it has been impossible to feel it, its presence has been revealed to the eye by the speculum. This at least is an assertion which has been made by some whose opinions must always command respect; but it appears to us that the difficulty of using the speculum in labour, and the impossibility of recognising the os when it is high in the hollow

of the sacrum, must render this mode of investigation a very unsatisfactory one. The treatment of labour obstructed in this way may come to be a matter involving considerable perplexity. If the os, or the situation where surrounding induration marks the point at which it has become occluded, can be discovered, mechanical means, such as sponge tents, and the like, must be used for its dilatation; but, when no aperture whatever can be distinguished, even when uterine action has been in operation for some time so as to bear upon the inferior segment of the uterus, no course remains for us but to incise the organ at the point where the os is usually found, and thus avoid the danger with which the woman is threatened.

The necessity for such an operation being once recognised, no advantage, but the contrary, will ensue from delay. Beyond a certain degree of uterine effort, all that is essential is the presence of such pains as may secure the passage of the head so soon as a channel is opened up for it. The effect of delay, indeed, in such a case, would be to incur the danger of rupture of the uterus, and to allow the period to pass at which the patient is best able to bear the continued strain entailed by the ordinary phenomena of propulsive labour. In so far as the operation is concerned, the incision should be made from before backwards, by a guarded bistoury, or by a series of incisions radiating from the real or imagined site of the occluded os. Great care should of course be taken not to wound the rectum or bladder; and the reason why the antero-posterior direction is preferred is that the uterine arteries may with certainty be avoided. The incision should be made to a limited extent only, for, the breach being once effected, and uterine effort being present, the head will, partly by stretching and partly by tearing, open a passage for itself as it is forced onwards. A number of morbid conditions of the os and cervix have occasionally been observed to cause serious obstruction to labour. Of these the most important is, of course, Cancer; but there are cases in which induration and hypertrophy of the whole cervix, or it may be of the anterior lip only, has constituted an impediment scarcely less formidable. In some instances, it would appear that the cause of obstruction may be an hypertrophied and elongated condition of the cervix, as in a case reported by Mr. Roper, in the Obstetrical Transactions for 1866. The treatment proper to such a condition would be dilatation by means of sponge tents, or by air or water bags. Abscess and thrombus of the lips of the os have also been encountered as rare impediments to the passage of the child.

Uterine Displacement.—The more important displacements of the gravid uterus have already been spoken of, and, from the

observations then made, the influence which such malpositions may exercise upon the progress of labour may be in a great measure inferred. The effect of displacement forwards—anteversion or anterior obliquity—of the uterus must necessarily be to throw the os backwards; and, at the same time, the axis of propulsive action deviates from that which is normal in proportion to the extent of the displacement. If, along with this, there is any contraction of the pelvic brim, the result of the misdirected force may be that the head does not become engaged in the cavity, and that the anterior and inferior part of the uterus is exposed to injurious pressure. This condition of matters—which is recognised by a combined abdominal and vaginal exploration—may best be remedied by raising the depressed fundus, and maintaining it in that position by a bandage. In this way, the axis of the uterus is brought more into coincidence with that of the brim, a result which may be still further ensured by a supine position.

Posterior and lateral obliquities have also been noted as impediments to delivery, but to these unnecessary prominence is given by most Continental authorities. In the former case, the os will probably be discerned in front, behind the symphysis, and, in lateral obliquities, the os will be directed to the side opposite to that to which the fundus is inclined. Although practical difficulty from these obliquities is rare, it may happen that the head remains above the brim, while the shoulder which is lowest in the uterus, slipping down, becomes the presenting part.

Abnormalities of Vagina.—An abnormal condition of the vulva and vagina, congenital or otherwise, may sometimes cause serious obstruction to the course of labour. Union of the labia and nymphæ may exist to a greater or less extent; and, as the smallest possible vaginal orifice is all that is essential to impregnation, an obstacle of this kind, whether congenital or the result of cicatrical union and contraction, may require the aid of art. The persistence of the hymen is another condition of a similar kind, which has sometimes been observed to such an extent as to constitute an impassable barrier. An extreme rigidity of the external parts has been noticed, chiefly in the case of women who become pregnant for the first time, either at an advanced age or very young. This rigidity of the perineum will generally yield to the vigorous pressure of efficient labour pains, but it sometimes happens that the resistance is obstinate, and requires assistance. In all these cases, incision should not be practised until the head has descended to the perineum, and then only to such an extent as may be absolutely necessary, remembering

always that a trifling incision thus made will be extended as the head advances.

Our anxiety, in such circumstances, would be chiefly directed to the perineum, a laceration in which may, as we have seen, prove a very serious matter by running back into the rectum. In order to avert such a catastrophe therefore, we should make the incision, not in the middle line, but on either side, so as to direct the tear laterally and not posteriorly; and, even when such lacerations may have a formidable appearance at the moment of birth, they will rapidly contract, and a few days afterwards will be no longer visible. If the obstacle depends —whether in the vagina or at its orifice—upon contraction which is the result of disease or previous laceration, the difficulties of the case may be very great. Not unfrequently the cicatrices are formed of strong ligamentous bands, which prevent the distension of the vagina, and may even pass across from one side of the canal to the other as imperfect septa. It has been recommended, when this is recognised early, that gradual dilatation should be attempted by means of tents or bougies. In the minor cases, the stricture will ultimately yield before the pressure which, during labour, is brought to bear upon it from within; but, in the worst cases, operative interference will be required. It has been found that free incision of such vaginal cicatrices is apt to be followed by serious hæmorrhage. What, therefore, is a much safer plan is to act in the same manner as we have recommended in incisions practised at other portions of the parturient canal. A number of superficial incisions or scarifications, parallel to the axis of the vagina, will, when the head descends, yield, and admit of tearing, which should be effected to such an extent only as may be necessary for its passage. Such tearing is, of course, free from the ordinary risks of hæmorrhage; but a moderate amount of bleeding is, perhaps, rather to be desiderated than otherwise, as it will tend to promote relaxation of the parts. The division of bands or septa may be conducted upon the same principle; and it has been recommended that we should with caution partially divide them during the pain, even allowing the knife to be forced by the contractions against the obstruction. If it does not speedily yield, the finger may be used freely to encourage the tearing asunder of these structures, using the knife as little as possible. In this way the difficulty will gradually be overcome, and the descending head will make its way, or may even be assisted by the forceps.

The vagina may be very small, or contracted congenitally at some part of its length, or in its whole extent—the canal, although sufficient for the purpose of impregnation or menstruation, being utterly inadequate for the function of parturition. Should such a condition as this

call for operative procedure, it will be necessary to give relief to the constriction by cautiously combining tearing with incision, as in the cases of contraction from adhesion, adopting such means as may be best suited to protect the adjoining hollow viscera from injury, and a similar mode of procedure may be found necessary in those cases in which the vagina has become seriously encroached upon, as the result of sloughing from whatever cause and of the cicatricial contraction which subsequently ensues.

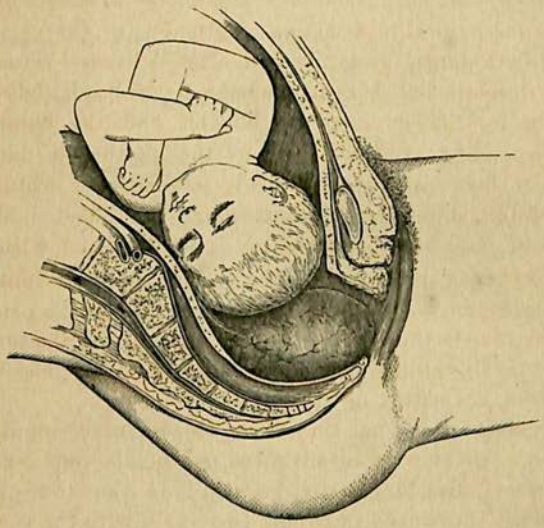
Tumours of Vagina.—Again, the soft parts may be the seat of diseased conditions, giving rise to tumours of any portion of the canal, which may prove mechanical impediments to labour. Œdema of the vulva has already been mentioned as an occasional result of pregnancy, and it would appear that sometimes this exists to such a degree as to constitute a mechanical obstruction. Thrombus of the vagina—which is observed both during gestation and after delivery—occasionally, by its unusual development, bars the passage of the head, and at the same time presses injuriously upon the bladder and the rectum. These tumours, depending as they do upon the rupture of blood-vessels, usually make their appearance suddenly—a diagnostic feature which is of considerable importance. Sometimes the blood infiltrates the cellular tissue, and at other times it is accumulated within cavities which it forms for itself, and, in the latter case, a certain degree of modified fluctuation will probably be observed, while the pain by which the original tumefaction has been accompanied, and the bluish colour which the tumour exhibits externally, will generally suffice to indicate, with precision, the nature of the case.

The prognosis of vaginal thrombus, whether occurring during pregnancy, labour, or at a more advanced period, is very serious. "Of sixty-two cases," says M. Deneux, "which have come to my knowledge, the mother has succumbed in twenty-two; and, with the exception of a single case, the children in those twenty-two cases were lost." In cases which prove fatal, sudden loss of blood seems to be the most common cause of death; but, in those instances in which this primary risk is avoided, gangrene or suppuration may ultimately lead to a fatal result. We have at present nothing to do with the treatment of thrombus occurring during pregnancy or after labour; but in those cases in which it constitutes an actual obstacle to delivery, nothing is open to us but free incision, which may be made in the most dependent portion of the tumour, and of such a size as its dimensions may seem to render necessary. Among the other tumours which may be encountered during labour, we may mention, in addition to those which have already been detailed, phlegmonous enlargements, cysts, syphilitic

vegetations, and such tumours as have been figured by Martin in his Atlas, as due to hypertrophy or degeneration of the nymphæ and preputium clitoridis—all of which must be managed on ordinary surgical principles.

Polypi.—Polypoid tumours, springing from the uterus, may sometimes constitute very serious obstacles to delivery, as is shown in Fig. 202. The mere existence of a tumour of this character is not, however, to be accepted as evidence of a condition which absolutely prohibits the passage of the child, as much will depend upon the mobility as well as the compressibility of the tumour. In a case published by Dr. Beatty,

Fig. 202.



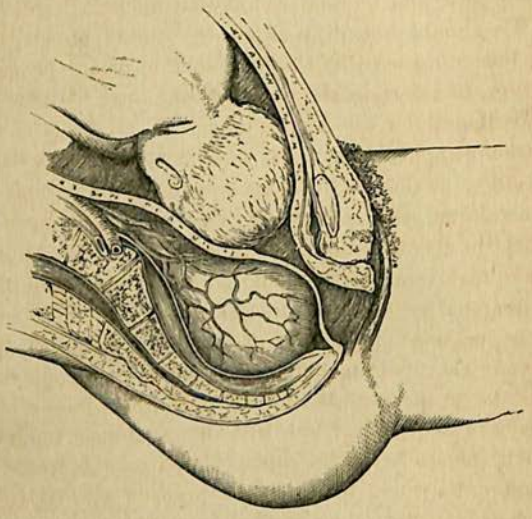
Uterine Polypus as an Obstacle to Delivery.

to which Dr. Churchill refers, "the tumour was so large and apparently so fixed, that Cæsarian Section was anticipated; nevertheless, at the time of labour, it was elevated sufficiently to allow of the birth of the child without any assistance." In some cases of polypi with a narrow pedicle, the effect of continued pressure and extreme effort has been to detach the growth, and expel it in advance of the child. The management of such cases will depend, in a great measure, upon the conditions already mentioned. If, for example, it is movable, and the head has not yet descended into the pelvis, so as to render such a result impossible of attainment, we should try, as has in some

instances been done with success, to push the tumour upwards during the interval between the pains, and retain it in its elevated position until the head takes precedence of it in its descent. Should this, however, fail, the nature of the tumour being undoubted, the proper treatment will be to remove it, which may be effected with the least possible risk by means of the wire écraseur.

Ovarian Tumours.—In some cases of ovarian disease, the tumour, instead of developing upwards, as is usual, in the direction of the abdominal cavity, falls downwards into the pouch of Douglas, between the rectum on the one hand, and the uterus and vagina on the other.

Fig. 203.



Ovarian Tumour obstructing Delivery.

Such a condition will, no doubt, as a rule, give rise to abortion or premature labour; but, as the system is often slow to respond to such influences, it may happen that pregnancy, under these circumstances, goes on to the full term. In such a case as this, the obstacle, mechanically speaking, is much the same as in the case of the uterine polypus just alluded to (see Fig. 203). The anatomical relations of a tumour such as this are widely different from the other case, as it is to be reached, not within the vulvo-uterine canal, but by perforation of the peritoneum either from that side or from the rectum. Such tumours vary considerably both in size and form, and the first point, therefore,

upon which it is necessary to decide, is whether or not it is of such a nature as to constitute an impossibility, or merely a difficulty, in the passage of the fœtus. This will depend in a great measure upon the structure of the tumour. Such growths are, as is well known, most frequently cystic in their nature, and, consequently, admit of a considerable amount of flattening, which would also be encouraged by the elasticity of their walls. The benefit of this mechanical advantage may, however, be lost by the nature of the pressure which is exercised by the advancing head; for, if the higher part be firmly pressed, as is quite possible, between the head or other presenting part and the pelvic brim, so as to bring the walls of the cyst into complete apposition, the lower portion may bulk still more prominently during a pain, and be rendered at that moment harder and more resistant. We should not, in such a case, confine ourselves to vaginal exploration, but endeavour, by the introduction of one or more fingers into the rectum, to ascertain the nature of the case, with such precision as may be possible under the circumstances.

The Treatment applicable to these cases must obviously depend upon the information to be derived from such examination as may be practicable. If the volume, seat, and nature of the tumour seem to encourage the belief that the forces of nature may prevail, we should do nothing further than to make sure, by securing an empty condition of the bladder and rectum, that no extraneous influence exists which may further complicate the acknowledged difficulties of the case. If, however, a purely expectant treatment should not result in the progress which we desire, it will be proper to attempt to push the tumour beyond the upper boundary of the pelvis; but, if it should show a tendency to fall back, which will generally happen during the interval between the pains, we must attempt to retain it in such a position as may enable us to apply the forceps or to introduce the hand for the purpose of version, in which latter case the arm of the operator in the vagina will prevent the tumour from again descending towards the floor of the pelvis.

In cases in which the descent of the head, or the existence of adhesions, renders any displacement of the tumour impossible, it is even of greater importance that we should recognise, what is not always an easy matter, whether or not it is cystic. If so, and we leave it to nature, the result will probably be either rupture and escape of its contents into the cavity of the peritoneum, or a violent inflammatory action, the result of pressure. The puncture of such cysts from the vagina, as advised by Merriman, has been practised with perfect success, and, in the present day, with our experience of the greater safety of the aspirator trocar, we would, in such a case, operate with an even

greater prospect of a successful issue, removing of course as far as possible the fluid contents of the tumour. Complete success can, under such circumstances, only be counted upon when the cyst is unilocular; but, when it is a multilocular cyst, or the contents are unusually thick, it has been found necessary, in order to lessen the tumour, to incise from the vagina, a mode of procedure which, although dangerous, is probably less so than the doubtful results of the accidents which we have indicated as likely to supervene, if the case be left to nature. Some have proposed puncture by the rectum; but, as the dangers of this operation are greater than the other, it ought to be rejected, unless, perhaps, under very peculiar circumstances.

When the tumour is solid, the difficulties of the case are greatly increased. In such a case, it being impossible to push it back, we have to balance the chances of embryotomy or the Cæsarian Section against an operation which has for its object the separation and removal of the growth. Merriman recommends that, if we can convince ourselves of the absence of serious adhesions, we should proceed by the method of extirpation; but, putting aside the difficulty of determining this point before the operation has actually been commenced, we fear that this procedure can seldom be justifiable. If the tumour be of such a size as to leave an available gap of an inch and a half or two inches in the pelvis, the operation of craniotomy would, we think, with the improved appliances now at our command, afford a much better prospect of success; and, even when this hope is denied us, the Cæsarian operation, if performed early, or, possibly, Porro's operation or Gastro-Elytrotomy, would give the patient a better chance than removal of the tumour, and might at least have the effect of saving the child. The result of all such operations has, however, been extremely unfavourable.

An accumulation of hardened fæces in the rectum has occasionally proved a very serious obstacle to labour. Such a condition can, of course, only happen where there has been great carelessness and neglect of the functions, so as to permit the lodgment of such a mass within the rectum as may actually bar the advance of the head. The treatment obviously indicated in such a case, is the relief of the bowels by means of emollient enemata; but, should these fail, owing to the size or extreme induration of the mass, it may be necessary to scoop out, or otherwise remove the contents of the rectum, and in one way or other the tumour will usually be dissipated without difficulty. The only other affections of the rectum which may be supposed to impede delivery are scirrhus, which has seldom been observed of such a size as to form a serious obstacle, and rectocele, in which the lower part of the gut protrudes into the vagina.

Vaginal Cystocele.—On the opposite side of the vaginal canal, the condition of the bladder may exercise an obvious influence on the progress of the case. The importance, not only in operations, but in ordinary obstetrical practice of attending to that viscus, so as to protect it from the effects of distension, is a point, as has already been repeatedly mentioned, of the highest importance, in regard to which neglect not only endangers the bladder itself, but may also cause an obstruction to labour. Cystocele, as an impediment, consists in the protrusion of the neck and lower part of the bladder in the direction of the vagina, forming a tumour of such size as to prevent the passage of the head. The idea usually entertained of this seems to have been that it is due, in a great measure, if not entirely, to neglect of the usual precautions for ensuring the evacuation of the bladder; but we are at one with Dr. Tyler Smith in supposing that this, although a possible cause, is certainly not the usual one. Prolapse of the bladder is by no means an uncommon, and is sometimes a very troublesome affection, in women who have borne large families, and, when a woman in whom this occurs becomes pregnant, we have reason to fear that unless special care be taken at the time of delivery, difficulties may possibly arise. The impediment will best be obviated by the opportune use of the catheter, and, if the cystocele already exists as an obstruction, care must be taken to pass the catheter backwards into the tumour, or to raise and press upon the latter so as to ensure its evacuation. Caution must be exercised in the diagnosis of this affection, for it has happened that the fluctuating sac has been mistaken for the membranes, and perforated with the view of giving exit to the liquor amnii, the assumed cause of the obstruction. It has also been mistaken and punctured, in a case reported by Merriman, for a hydrocephalic presentation.

An interesting illustrative case, in which the tumour was of considerable size, is narrated by Madame Lachapelle. "The first thing," she writes, "that attracted attention was a pediculated tumour, about the size of an egg, which, projecting a little from the vulva, seemed to be attached to the anterior and right wall of the vagina, about its middle part. The pedicle was about an inch and a half in thickness, and the tumour contained a fluid which could be completely pressed out of it through the pedicle, when we were able to feel an aperture with thickened borders, which appeared to me to communicate with the bladder. In reference to the position of the woman, it was found that the tumour increased in size in the erect posture; it often disappeared after micturition, and was always retracted under the influence of a cold bath. The uterine contraction increased the volume of this hernia, and

the head, in its descent, pushed it in advance, and stretched it strongly. I reduced it after having emptied the bladder, and I recommended the pupils to support it with two fingers during each uterine contraction. The head soon cleared the passage, and itself retained the hernia, and the labour terminated happily."

Stone in the Bladder.—A urinary calculus may, of course, co-exist with the pregnant state, but will usually produce no effect, mechanical or otherwise, upon the progress of gestation. In rare instances, however, it has been found that the stone has been so placed as to be imprisoned in the lower segment of the bladder by the pressure of the head of the child against the pubis. The advance of the head still further tends to confirm this position, and, ultimately, the stone, encroaching as it does, upon the caliber of the pelvic canal, constitutes a serious impediment to delivery. The circumstance in which a calculus is most likely to be an obstacle to labour, is when it is complicated with vaginal cystocele—an anatomical condition of the parts obviously favouring the descent of the stone by gravity. Smellie gives among his cases that of the wife of a coal porter, who, having long suffered from the symptoms of stone, became pregnant. She was attended during labour by a midwife, who recognised the presence of a hard body in advance of the head, but, her resources being limited, she was content to wait and watch the progress of events. Ultimately, a hard and rounded substance of considerable size was extracted from the vagina, which, on examination, was found to be a calculus of large size. The removal of the obstacle admitted of the immediate passage of the child; but the incontinence of urine, which remained, was, undoubtedly, due to vesico-vaginal fistula—an accident then considered irremediable.

The treatment of all such cases will consist—if the period has not already passed when this may be effected—in attempting to push the stone upwards into that part of the bladder which is above the brim, and, if necessary, retaining it there during the intervals between the pains, until the head shall descend, so as to prevent its slipping down again. If the head has already made some advance in its passage through the pelvis, it may still be possible to push up the stone by operating during the interval between the pains, if only we can displace the head a little so as to admit of its passage upwards. But, if the calculus is so placed that it is impossible to dislodge it from its position, the case may become a very serious one, as the only remaining resource will then be the removal of the body which prevents the accomplishment of the function of parturition. The safest mode of procedure, as to its immediate results, would, under such circumstances, probably be

the dilatation of the urethra and the extraction of the stone. Such an operation is, however, open to two objections. In the first place, it can only be safely performed slowly, a condition which obviously does not suit the exigencies of the case; and, again, it may leave unsatisfactory results in a long continuance of incontinence of urine. It is probable, therefore, that the most judicious course would be, when the obstacle seems such as to preclude the possibility of safe delivery by the forceps or turning, to perform the operation of vaginal lithotomy, cutting down upon the stone through the neck of the bladder, and removing it in the usual way. The operation of lithotrity has also been suggested; but, in so far as we are aware, it has never been practised.

Hernia.—Certain rare forms of hernia may co-exist with pregnancy, and may even form impediments to the termination of labour. It is, it must be confessed, very unlikely that such tumours should, in any considerable degree, oppose the passage of the child; but there undoubtedly exists the more indirect, but not less serious danger, which arises from compression or strangulation of a hernial tumour, wherever situate. Such herniæ have been observed in the posterior part of the pelvis, the bowel, or omentum, or both, having descended, in the first instance, into the cul-de-sac of the peritoneum which lies between the vagina and the rectum, making its way downwards in the same direction, until it may ultimately protrude at the perineum, and form a perineal hernia; while, if it bulges into the vagina, it is a vaginal hernia. The protrusion may also take place from a different quarter, the bowel passing along the canal of Nuck, and ultimately forming a tumour in the labium of either side, which is anatomically analogous to scrotal hernia in the male. The diagnosis of these tumours will seldom cause much perplexity if the case is one of ordinary enterocele; but, if it be constituted by the omentum alone, the absence of gurgling on reduction, and of other characteristic signs, may invest the case with considerable obscurity. The treatment in all cases is the same,—to practise the taxis, and maintain the displaced viscus in its proper situation while labour is in progress, with the object, as we have said, partly of preventing the possibility of mechanical obstruction, but mainly with the view of protecting the displaced parts from injurious pressure.

Other Tumours.—The various tumours which have been described do not, it need scarcely be said, embrace all the possible varieties of abnormal growth, which may be encountered as impediments to the progress of labour. Fibrous, fatty, or encysted growths may spring from any portion of the cellular tissue of the pelvis. The direction which these most frequently take, is that of the recto-vaginal pouch;

but they have also been observed in the sides of the canal, and even between the uterus and the bladder. To distinguish such abnormal structures from those which have their origin in the tissues of the various organs which are situated in the pelvis will always be a matter of difficulty, sometimes of impossibility. Everything will depend upon the mobility and compressibility of such tumours, and the result, in many cases, will simply be an increased difficulty in the passage of the child, the forces of nature ultimately overcoming the obstacle.

But, in some cases, the volume and immobility of the tumour may be such as to preclude the possibility of any such favourable result; and, in that case, we may be forced to adopt such surgical means as may with the least risk get rid of the difficulty. If it is a cyst, it will be proper, therefore, to evacuate its contents, and, if solid, its size, shape, and the nature of its connection by adhesion or otherwise, must serve as our guides to such operative measures as, on general principles, the nature of the case seems to demand. Excision of such tumours is, of course, under these circumstances, an operation which is attended with peculiar risk: it has been practised by an incision through the vaginal walls, and, in some other cases, with success, by a more extensive incision involving the thickness of the perineum. The worst cases are those in which the size of the tumour, its immobility, and the great extent of its adhesions, render such operations impracticable, and, in these, nothing will be left to us beyond the more desperate resources of operative midwifery.

Malignant Growths.—Frequent reference has been made to malignant tumours as obstacles to delivery. The nature of this fearful class of diseases is such that the impediment may have its origin in the bones or ligaments, or may spring from the uterus, bladder, rectum, or any conceivable part or structure of the pelvic contents. Moreover, from a tumour of trifling size, it may attain dimensions which are only limited by the capacity of the pelvic canal; and the tendency of all malignant growths to invade contiguous textures frequently places the case in a category peculiar to itself, inasmuch as it is impossible to isolate it either for the purpose of removal or dislodgment. In the advanced state of the ordinary forms of malignant disease, the hardness of the tumour, the infiltration and infection of surrounding tissues, the binding together of the parts, the presence of ulceration, and the existence of marked cachexia, will generally render diagnosis a matter of no difficulty.

In the initiatory stage of the disease, the diagnosis will naturally be more obscure, and in cauliflower excrescence, and the rarer fungoid forms of malignant disease, the symptoms are very different from those

above indicated, but are still sufficiently characteristic to enable us to form a definite opinion as to the nature of the case. From what has been said, it will be obvious that no surgical rules can be laid down for the management of cases such as these, whether the tissue primarily invaded be the labia, the uterus, or any other portion of the canal. The nature of the case, and the extent of the obstruction can only be our guides. Malignant atresia has repeatedly been overcome by incision of the diseased structures, with success as regards delivery of the child; but, in those cases in which the disease is extensive, it will only remain for us to decide between the forceps and the other more serious operations.

CHAPTER XXXVI.

OBSTRUCTION DEPENDING ON THE STATE OF THE OVUM.

Hydrocephalus: Diagnosis: Management.—Spina Bifida.—Obstruction from Ascites, Hydrothorax, and Distension of the Bladder.—Gaseous Distension from Putrefaction.—Tumours springing from the Fœtus.—Anchylosis of the Joints, and Intra-uterine Fracture.—Premature Closure of the Sutures.—Unusual Development of the Fœtus.—Special Difficulties in Plural Pregnancy: Locked Twins.—Monsters which impede Delivery; The Siamese Twins, and other Similar Cases.—Shortness of the Umbilical Cord as an Obstacle.—Dorsal Displacement of the Arm.—Thickness and Persistence of the Membranes.

It not unfrequently happens that, although the maternal parts are, in every respect, normal, and the position is everything that may be desired, the relative proportions which should exist between the ovum and the canal are disturbed by an abnormal condition of the former. The peculiarities in structure which give rise to mechanical obstruction of this nature, consist, mainly, of an increase in size, whether of the whole fœtus or of some of its parts, arising, in one class of cases, from faults of development, and, in another, from the effects of intra-uterine disease. The peculiarities alluded to may affect either the fœtus itself or some of the other parts of the ovum: no reference is here made to malposition of the fœtus, a subject which has already received full consideration.

Hydrocephalus.—The diseases of the child from which such unfortunate conditions spring, are those in which some one of its parts becomes the seat of such an increase in size as to constitute an impediment, more or less serious, to the progress of labour. Of these the more important are hydrocephalus, fluid distension of the great cavities of the trunk, and tumours of various kinds springing from its external surface. Hydrocephalus is, of all such affections, not only, as might be expected, the most important from a mechanical

point of view, but is so also in point of frequency. One form of this affection, or rather one which has been by some writers erroneously described as such, is an effusion of fluid beneath the scalp or pericranium, and, consequently, external to the cranial cavity. Examples of this which has been termed External Hydrocephalus, are very rare, and have usually been found to be associated with a general condition of infiltration affecting the whole of the external tissues of the fœtus. It is a condition which usually implies the death of the fœtus, so that any serious impediment from a child which is in all probability putrid need scarcely be anticipated.

The internal variety, or what is known as true Hydrocephalus, is a much more serious as well as a more frequent occurrence, and may exist to such an extent as absolutely to preclude the possibility of delivery by the unaided efforts of nature. In this case, the fluid effused within the cranial cavity varies greatly in quantity. In those instances in which the quantity is small, the difficulties of parturition may not be materially augmented, as the compressibility of the head is, in consequence of the nature of its contents, relatively increased—a condition which obviously tends to facilitate its passage, and compensates for the actual increase of bulk. Owing to this, indeed, and associated probably with ample pelvic diameters, very large heads have been known to pass naturally. In some cases, the head, in consequence of the quantity of fluid which is poured out by the morbid process, attains enormous dimensions. When the disease is slow in its progress, the flat-bones become developed to a very unusual extent, but when more rapid, the deposit of bone does not keep pace with the distension of the head, and the latter, under such circumstances, may present itself under the form rather of a bag of fluid than of an ordinary cranial presentation. The rule certainly is that the process of ossification fails to overtake that of fluid distension, and a marked characteristic, therefore, of hydrocephalic heads, is that the sutures and fontanelles are more apart than usual.

When the size of the head is considerable, and the Symptoms consequently well marked, the recognition of hydrocephalus is generally easy enough. The presenting part, which in these cases is arrested above the brim, is found to be less resistant and less convex than usual. The sutures and fontanelles are, however, to be distinctly felt, and, if we can feel that the former are agape, and the latter of larger size than usual, with more or less of a feeling of fluctuation, there will be little room for doubt. The existence of a large posterior fontanelle is particularly characteristic, and, if the hand be fully introduced, the great size of the head will be recognised.

This applies, of course, to those cases only in which the cranium

presents at the brim. It often happens, however, in such instances, that the same reasons which, under ordinary or normal circumstances, cause the head to adapt itself to the smaller end of the ovoid cavity of the uterus, operate by so determining the presentation, that what is here the larger extremity of the fœtal oval lies in the fundus of the uterus, the pelvic extremity being downwards. The conditions being thus absent upon which alone our diagnosis can depend, no suspicion is entertained as to the nature of the case; and it is only when, after the breech and trunk have passed the brim, and the head is there arrested, that suspicion is awakened, and the existence of hydrocephalus possibly recognised. For, in such cases, it is by no means an easy matter to make sure of this, as it is only a limited portion of the occiput which can be reached with the finger; but, if we find the pelvis of average dimensions, and are able to recognise a large head with its bones loosely articulated, and a trunk and limbs somewhat less in size than usual, we shall probably take these facts as sufficient collectively to warrant a confident decision. Another symptom which, when the head presents, has been insisted upon by Blot, is that while the head is absolutely arrested at the brim, the whole body of the fœtus is higher relatively to the abdominal walls; and, therefore, the pulsations of the fœtal heart may be recognised by the stethoscope as high as, or even higher than, the level of the umbilicus.

The nature of the obstruction depends, not merely upon the quantity of fluid effused within the cranium, but also upon the development of the flat-bones, and the degree of compression of which the head is susceptible. These conditions may, however, with truth be regarded as subsidiary to another, arising from the manner in which the head descends and becomes engaged in the pelvis. A mere bag of water (and the head is sometimes actually reduced to this condition) may, so long as it remains unruptured, be an impediment as insurmountable above the brim as an absolutely solid mass would be. But, if the conformation of the parts, and other conditions, should permit of the engagement of such a tumour, so that its lateral walls are efficiently compressed by the pelvic canal, matters are so completely altered, that an elongated oval, containing an equal bulk of fluid, may get through the passage, while one which is spheroidal, or, with reference to the aperture of the brim, transversely ovoid, cannot even enter. It is, no doubt, on this principle that those cases have occurred, of which we read, where a child has been born alive, with a head measuring, in its circumference, twenty-two or twenty-four inches, whereas the normal standard is about thirteen inches and a half.

While recognising these facts, however, the operator must beware of

trusting to such a result, unless he finds that the pelvis is ample, and the cephalic tumour is pointing downwards, thus giving indications of moulding itself to the pelvic canal. There are, perhaps, few contingencies in the practice of midwifery in which a careful and early diagnosis is of greater importance than here; for, however revolting the operation of craniotomy may be to a well-regulated mind, the more fearful risk of delay must be from the first admitted into our calculation. In seventy cases, collected by Dr. Thomas Keith, rupture of the uterus occurred in so large a proportion as sixteen; while, in every one of the five cases reported by Dr. Robert Lee, in his Clinical Midwifery, the mother was lost either from rupture of the uterus, or inflammation of the organ, facts which—independently of many others corroborating the conclusion—point significantly to the danger that, in such cases, attends delay.

The indications of Treatment are, from one point of view, sufficiently obvious, but our action will, in no small measure, be swayed by the presence or absence of symptoms indicating the vitality of the child. If the child is dead, we do not require to wait for absolute certainty of diagnosis. Evidence of serious obstruction is all that, in such a case, we would think necessary to warrant us in perforating and giving vent to the fluid which is pent up within the cranium. But, when the child still lives, the responsibility which attaches to the operation is greatly increased, and the error which, in such cases, is more likely to be committed, is that the operator may wait until the mother has become exhausted or the child has died; whereas he ought to have sooner recognised the fact that the passage of a living or viable child was impossible, and have acted upon the principles which we have already laid down as applicable generally to cases of destructive or sacrificial midwifery. The immediate effect of craniotomy, in hydrocephalus, is, by permitting of the escape of a large amount of fluid, to reduce the bulk of the head to an extent much greater than obtains when peforation is practised under other circumstances. It may happen, as in some recorded cases, that the operation, as well as the diagnosis, may be complicated by the co-existence of what has been described as "external," along with internal hydrocephalus, when it may be necessary to evacuate the external accumulation of fluid before piercing the cranium. To such an extent does the distension sometimes occur, that several pints of fluid have been removed by simple perforation, when collapse of the cranium takes place, so as to permit of the expulsion of the head under the influence of the natural efforts.

It has happened that, after perforation, and evacuation of the serum contained within the cranium, the child has been born alive; so that,

although the chances of a child surviving under such circumstances may be considered as extremely small, it has been urged by Cazeaux that the operation should be so performed as, if possible, to prevent laceration of the cerebral structures, and the inevitable sacrifice of the child which must thus ensue. Should this fail, the operation of turning may suggest itself, and we cannot doubt that the yielding condition of the vault of the cranium must make the mechanical advantage claimed for this operation more conspicuous than in an ordinary case; but, in an extreme case, we may be sure that this too will fail, and eventually, after turning, we should have to terminate the labour by perforation. From what has already been said, it will be apparent that, in the minor cases, any mode of procedure which may promote lateral compression of the head may, with possible advantage, be adopted in preference to craniotomy. With this in view, therefore, it is usual and proper to attempt delivery, in the first instance, by means of the forceps, when the compressing power of that instrument may be employed to a somewhat greater extent than is usual.

If the difficulty should arise in an original presentation of the pelvic extremity—which occurs, according to Scanzoni, in one in five of all cases of hydrocephalus—the operation is one which cannot be performed with the same facility as in a cranial presentation, and the conditions are precisely the same as when podalic version has been performed. Various modes of procedure have been suggested as applicable to such instances. It has been found possible, for example, to reach the cranial cavity through the mouth, by piercing the base of the skull through the vault of the palate, and, in other cases, it has been successfully practised through the orbit; but what, in such cases, we would recommend, in preference to either of these methods, would be direct perforation behind the ear, should it be possible to reach that part of the cranium. It has sometimes happened that the tumours which are connected with osseous deficiency of the cranium or vertebral column, and which are known to the surgeon as Encephalocele and Spina Bifida, have attained such dimensions as to prove an obstacle to delivery, in which case it may be necessary to perforate the tumour and evacuate the fluid which it contains.

Ascites, etc.—Effusions into the other great serous cavities of the body, although less frequent in their occurrence than hydrocephalus, render delivery equally impossible. In Ascites the development of the abdomen is sometimes enormous, and is revealed by the fluctuation as well as by the size. The only affection of a similar kind with which we might possibly confound it, is distension of the bladder, which, when the urethra is impermeable, may possibly give rise to a tumour of great size,

which may require tapping equally with the peritoneal effusion. The description of such a case was communicated by M. Depaul to the Académie de Médecine, and this, it may here be observed, is, along with other similar cases, one of the most important points of evidence upon which physiologists rely in supposing that the urine of the fœtus is naturally evacuated into the amnionic cavity. When the peritoneum of the child is distended with fluid, so as to prevent its passage, that cavity must be pierced by a trocar, and the fluid which it contains drained away by the cannula.

3 Hydrothorax is still less frequent in its occurrence. It is indicated by an enlargement of the thoracic region and intercostal bulging, and may require puncturing between the ribs, with precisely the same object as in the other case. In all these cases, the operation of perforation should be so performed as to avoid injuring the internal organs, for not only would this entail unnecessary mutilation, but it might defeat our object by preventing the escape of the fluid. The development within the body, as a result of putrefaction, of enormous quantities of Gas, is a fact familiar to the medical jurist, and may take place within the cavities of the fœtus as well as under other circumstances. In some rare instances, in consequence of this, severe laceration of the maternal parts has occurred, with a fatal result, and, in other cases, labour has been terminated in consequence of a rupture of the fœtal tissues giving issue to the pent-up gas. No hesitation should, in such a case, deter the operator, as the evidence of the child's death will be otherwise complete, and he is bound to act so as to protect the mother from risk.

5 Tumours of various kinds may spring from the surface of the fœtus, or be developed in connection with some of the internal organs, and may, by attaining unusual size, render natural termination of labour impossible. Tumours have, for example, been observed, which had their origin in the liver or the kidneys, enlarging the trunk to an enormous extent, so as absolutely to prevent its passage, and render indispensable the operation of embryulcia, in the course of which it has been found necessary to break up the tumour, and remove it piecemeal before we can complete the delivery.

Another rare condition of the fœtus, which may be a very serious 6 obstacle, is Anchylosis of the articulations, and the same may be said of those cases in which there has been intra-uterine Fracture as the result of violence, the limbs having united at an angle. It is difficult to say what, under such circumstances, should be done, if the condition has been recognised before birth; but, in so far as anchylosis is concerned, we may assume that the joints will probably be united while the limbs are flexed upon the body in the usual attitude of the fœtus, and that the

conditions are, therefore, not altogether unfavourable to the natural termination of labour. A more serious impediment has been in some instances found to arise from premature Closure of the Sutures and Fontanelles. This, in a perfectly normal condition of the parts otherwise, may give rise to great delay, if not impaction, by its being impossible for the head to adapt itself in any wayt o the shape of the passage; and, as Dr. Tyler Smith has observed, the dangers of such a condition are not limited to the mechanical hindrance to delivery, but it may be looked upon as an extremely probable, if not certain cause of idiocy, by preventing the development of the brain.

Great Size of Child.—The child sometimes, even when not retained within the uterus beyond the ordinary period of gestation, attains a size so greatly in excess of the ordinary standard, as to cause a very difficult or dangerous labour. If we take, as has already been stated in round numbers, the average weight of the fully developed fœtus as seven pounds and a quarter, we are not astonished when we find in practice that, when it approaches twelve pounds, the labour is, unless the maternal parts are of unusual capacity, a slow and painful one. But, when it reaches a size much in excess of this (as in some well-known and authentic cases already cited) it is difficult to conceive how by any possibility such a child could pass. If, however, we look closely at children which are much above the average, it will be observed that the increase in weight is to a great extent due to the development of fat beneath the skin, so that it is the trunk and limbs, rather than the cranium, which are increased in size, and it is on this account that we find the powers of nature sufficient to effect expulsion. If the increase of bulk has been the result of a protracted sojourn of the fœtus in the womb, the case will probably be more serious in its nature; and, in all such, we may be sure that the maternal as well as the fœtal mortality will be increased relatively to the size of the child. Statistics, indeed, tell us that this is the case, even as regards the comparatively trifling difference which exists between the male and female cranium. It is, however, very rare that, in the absence of pelvic deformity, cases of unusual fœtal development may not be delivered by the forceps or turning, which we may term the minor operations of midwifery.

Plural Pregnancy.—The occurrence of plural pregnancy may in various ways give rise to difficulty, and even to serious obstruction. In the case of multiple pregnancy, the products of conception may be disposed in almost any manner compatible with the limits and mechanical conditions of the uterus; but it does not appear that any great difficulty has been met with, in these instances, unless one or more of the children

have been in a faulty position. The same remark applies to twin pregnancy. In the latter, the two children are most frequently observed to occupy each a side of the womb, with the cephalic extremities downwards, and one head somewhat in advance of the other. In a very considerable number, the head of one child and the breech of the other present; while, in rarer instances, the feet of both may be downwards, or one or both may lie transversely in the womb. In plural pregnancy the uterus, no doubt, acts at a certain mechanical disadvantage, inasmuch as its propulsive force is communicated to that fœtus which is lower in the uterus—not directly, as in single pregnancy, but indirectly through the body of the other. But, as has been well observed, this disadvantage is usually compensated for by the comparatively smaller size of the children. The cases where delay is most likely to occur are those in which the breech of the first child is the presenting part, and, as this descends, the difficulties, as in ordinary cases, will be greatly increased by any unusual resistance at the outlet.

As has already been observed in an early chapter, when the subject of plural pregnancy was under discussion, there is very often a period of considerable delay after the birth of the first child. This is probably due, in many instances at least, to uterine exhaustion, and the pause which then ensues is a perfectly natural condition, which we should rather encourage, as it enables nature to recruit her exhausted forces, and thus bring them into renewed activity when the period arises for the expulsion of the remaining contents of the uterus. The recommendations, therefore, which are given by some authorities as to the circumstances which warrant, in such cases, operative interference, should be received with great caution, and only acted upon when the conditions are such as to indicate beyond the possibility of doubt, that it is proper to aid or precipitate labour in any way.

Locked Twins.—But the most serious mechanical difficulty which may arise in the course of labour in plural pregnancy, is what has been described in the case of twin pregnancy as "locked twins." When the membranes are, as has previously been shown (see pp. 214, 215), so arranged that each child lies in its own sac, the expulsive forces act, even under such mechanical disadvantages, so as to expel one child first, and to leave the other still enveloped in its own amnion. The first birth thus takes place without any particular difficulty. But, if they are enclosed in one amnionic cavity, the parts of the two may fall into such a position as to make delivery a matter of the greatest possible difficulty. The most common form of locking is when the first child presents by the breech, and passes downwards up to a certain point without impediment, but, when serious obstruction occurs, and we are

thus led to make a more particular examination, it is discovered that the descent of the head is obstructed by the presence in the pelvic cavity of the head of the second child, which has caused the chins to be so hitched together that the completion of the first birth is rendered a matter of impossibility, unless the twins are small or the pelvis large. If, under such circumstances, we pull upon the body of the partially born child, we only make matters worse by locking them more firmly together. In some cases, when the condition of the parts is such as to admit of it, it may be possible, by pressing back the heads in the direction of the uterus, to unlock them, and thus to permit of their descent singly. But, if this endeavour should fail, it will become evident that the only way to disengage them is to break up the compound wedge and so admit of the passage of one or other of the children.

This may be effected in two ways, either by decapitating the first child, which we have the least chance of saving owing to the pressure which is being exercised on its umbilical cord, or by perforating the head of the second child, so as to admit of the passage of the first. In the first case, the body which occupies the vagina will at once pass, and its head receding will admit of delivery of the second child by the forceps; and in the second case, which is only justifiable when we have reason to believe that the upper or second child is dead, we allow the perforated head to be flattened to such an extent as to admit of the passage of the head of the first, through the diameters which the operation has succeeded in reducing. This latter plan has this obvious advantage over the former, that the difficulty of extracting the severed head is thereby avoided.

There is another form of locking, in which both of the twins present by the head. The first head passes in this case without difficulty into the pelvis, but the head of the second, descending along with the trunk of the first, prevents further progress by presenting the bulk of a head and a thorax simultaneously at the brim. The mechanical management of such a case as this may be a matter of even greater difficulty than the former. Perforation of the head which is within reach can obviously do no good, so that it is only by guiding the perforator upwards to the second head, and reducing its bulk in the usual way, that the operation may, with any hope of success, be adopted. In such cases, as has been shown by the experience of Dr. Graham Weir and others, it may be possible, by dexterous manipulation, to obviate the serious difficulties which exist. It has been found practicable in this way to extract by the forceps the child which originally presented while the head of the other was pushed aside by an assistant. External manipulation has also succeeded, in skilful hands, in forcing onwards

the head which was situated highest in the pelvis, and thus causing it to take precedence of that which originally presented. All cases of locked twins are, however, serious complications, and are therefore with justice looked upon as among those dangers against which the operator should be prepared.

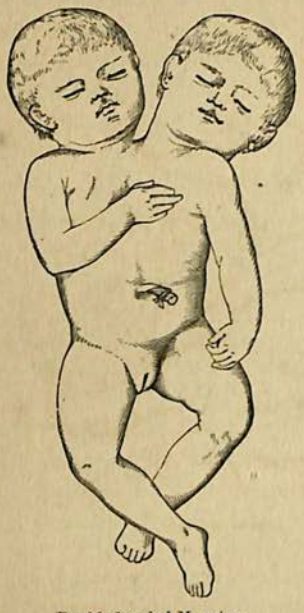
The first or second child may present in a preternatural manner—by the shoulder for example, as has before been explained—and in such a case, we have to beware of the mistake, which has been committed, of seizing the wrong foot or feet when the hand is introduced for the purpose of turning; or it may happen, as in a case narrated by Madame Lachapelle, that, when turning has been successfully effected, and the breech extracted, locking by the chins is the perplexing result. It is to be borne in mind that, in plural pregnancy, there is a greater risk of hæmorrhage, owing to the extent of surface to which the placenta is attached. And, in cases in which there is an inosculation of the cords, there is at an earlier stage, another special risk, if we leave the placental portion of the severed cord untied.

Monsters.—Various forms of Monstrosity give rise to difficulty in the course of labour; and, in extreme cases, it is only possible to complete delivery by embryotomy or the Cæsarian Section. We have here, of course, nothing to do with such departments of teratology as are illustrated by acephalic or anencephalic monsters, and still less with those which are anopic or cyclopic, as such conditions present no mechanical obstacle whatever. The many different forms of ectopy present, as a rule, little or no difficulty; but, in the more complete form, as in a case figured by Vrolik, the whole of the thoracic and abdominal viscera are external to the child, and may impede its passage. It has been observed, in another form of monstrosity, that the liver projecting through the unclosed umbilicus (*Exomphalos*) has, by its augmented size, caused a serious impediment, which might well be expected to bar the progress of ordinary labour.

The forms of monstrosity which are, from the point of view of mechanical obstruction, the most serious, are those in which the two children in a twin pregnancy become fused together to a greater or less extent, the union or fusion being anatomically symmetrical. Infinite as the varieties of such cases are, this rule is never violated, and is indeed the only possible method of which the laws which regulate development can admit. Thus, we have union of sacrum to sacrum, occiput to occiput, or abdomen to abdomen; but never sacrum to occiput, or abdomen to sacrum. There may be one perfect trunk with two heads, as shown in the annexed cut, which closely resembles a case of this kind, which we had an opportunity of seeing with Dr. George Mather; but

the union may be even higher than the cervical vertebræ, when we have more or less fusion of the crania. In such a case as the one here represented, in which the size of the various parts was rather more than is usual at the full time, a mere glance will suffice to show, not only that labour must necessarily be impeded, but that it is scarcely possible, in a normal condition of the parts as regards size, that a natural termination should take place.

Fig. 204.



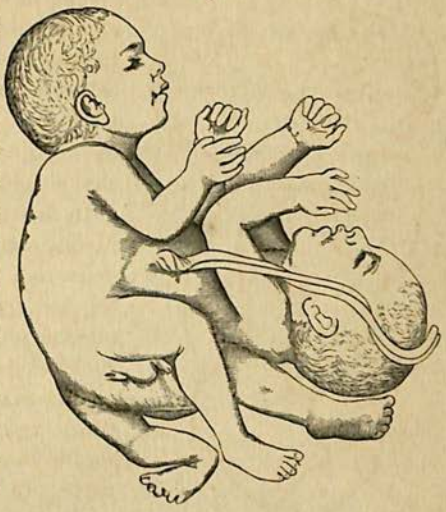
Double-headed Monster.

In a case which was described by Meigs, one head descended first, and was delivered. It then became fixed under the sub-pubic angle, and the ultimate process of delivery was precisely similar to what takes place in the spontaneous expulsion of a transverse presentation, the trunk, breech, lower limbs, and, lastly, the second head, passing through the external parts. In the case to which reference was made above, delivery was accomplished with the greatest possible difficulty. It was a primiparous case, and the breech was the presenting part, everything going on well until the heads entered the pelvis, when complete arrest took place. The crotchet failed completely, and as Dr. Mather thought that the head was too high to use the perforator with safety, he attempted, by means of steady traction, to bring it more within reach, when, to his astonishment, two heads descended, situated obliquely, with reference to each other, in the pelvis, so that the one was a little in advance of the other. In this way, and after long-protracted efforts, the heads, which were quite the average size, passed. The pelvis was, as might have been expected, a capacious one; but even this does not make the case less interesting. The mode of delivery described by Meigs is generally supposed to be the only possible way in which such a child can be born without perforation or decapitation; but the case above given, which is extremely rare, if not unique, shows that, if the other be the rule, it has at least, like many other rules, exceptions.

In that class of cases in which there is one head and a double condition of the lower parts of the body, the mechanical difficulty is not likely to be so great, as it is much more conceivable that two pelves

could be sufficiently pressed together during their descent as to admit of their simultaneous passage through the pelvis of the mother. The monster here shown, from one which was described by Dr. J. G. Walter, has three legs and four arms. Complete fusion of the pelves was found, on examination after death, to have occurred, and there was also union of the ensiform cartilages. On first sight, it may appear that delivery, in such a case, would be even more difficult than of the ordinary two-headed monster, but a little consideration will show that the possibility of one head at a time passing along the pelvis, gets rid of the greatest difficulty which attaches to this variety. The probability of a transverse presentation is in such a case, however, very strong, and this, of course, would be a most unfortunate circumstance, as turning and bringing down the feet would inevitably bring the heads together, and thus make matters worse than ever.

Fig. 205.



Double Monster.

It has occasionally happened that twins, more or less completely united or fused together, have been born alive, and have even attained maturity. In the most familiar instance of this kind—that of the well-known Siamese twins—there was a mere band of union; but it is indeed difficult, in regard to this and other similar cases, to conceive even the possibility of birth, unless after mutilation or putrefaction; in fact, we can only suppose in reference to such, that the maternal pelvis has been of unusual capacity, that labour has occurred prematurely, or that both of these conditions have been combined. Another comparatively rare form of monstrosity has been mentioned under "Twin Pregnancy" as monstrosity by inclusion; and, in this case, the tumour of the perineum, which contains the *fœtus in fœtu*, may be a serious obstacle. It will readily be understood—and the more so as they are of extremely rare occurrence—that such cases may cause great perplexity to the accoucheur, and, whether the diagnosis is accurately formed or not, cannot fail to be a very serious barrier to delivery. So various, how-

ever, are the forms under which monstrosities present themselves, that it is impossible to lay down any general rules which might serve for the guidance of the practitioner. In a considerable number of cases, it has been found necessary to decapitate, eviscerate, and otherwise mutilate one or both of the united twins or repeated parts, before it has been possible to relieve the woman of the contents of her womb. Care must, it need scarcely be added, be taken, not only to ensure correctness of diagnosis, but also not to operate rashly, for there can be no doubt that we are morally bound to consider the life of monsters as scrupulously as that of the fœtus in normal pregnancy.

Shortness of Cord.—Shortness of the umbilical cord is generally mentioned in systematic works as a possible mechanical hindrance to delivery. It is certain, however, that such an occurrence is extremely rare. We do not mean to assert that the cord is not occasionally short, but merely that this effect of shortness is not one which is likely often to take place. Cases do occasionally occur, in which the actual length of the funis does not exceed a few inches, a condition which, if the placenta is normally situated, must imply delay in delivery, rupture of the cord, premature separation of the placenta, or inversion of the uterus. Some have denied that any impediment whatever is in this way likely to arise; but the evidence which has been advanced in favour of the contrary view seems pretty clearly to show that in cases of protracted labour, which have only terminated after rupture of the cord, the cause of the delay must have been the extreme shortness of the link which bound the fœtus to its utero-placental attachment.

What is certainly of more frequent occurrence than actual shortness of the cord is—what has, mechanically, precisely the same effect—coiling of the cord round the child. In such cases, there is usually not only no shortening of the cord, but an undue length of it, which is the original cause of the coiling which takes place round the neck more frequently than round any other part of the fœtus. This artificial shortening is, we believe, of more frequent occurrence than is usually supposed, and every practitioner knows that few things are more common in practice than to find one, two, or more coils of the funis round the neck of the child. The exact stage of delivery at which arrestment from this cause is most likely to occur, depends upon the length, or the length exclusive of coils, of the cord; but, as a rule, it would appear that it is seldom that much inconvenience is complained of until the stage of expulsion approaches, when, for the first time, the cord is put upon the stretch, and pain is, probably, to some extent complained of in the region of the uterus. It has been stated, as a symptom during labour of shortness of the cord, that, if the placenta is attached

at its usual site, a depression of the fundus occurs at every pain, the rounded form being restored in the interval. That such an occurrence may take place, it would be impossible to deny, but it seems to us pretty clear that this is one of the instances, of which illustrations are too frequent in medical literature, where what we may call a theoretical symptom is set down as a real or practical one.

It has frequently been observed, when the cord was coiled round the neck of the child, that progress was for the first time arrested during or after the birth of the head. This has probably, to some extent, led to the routine practice of disengaging the coils as soon as their presence is detected—although the main cause undoubtedly is a dread of suffocation of the child by pressure on the respiratory passages. It has in some instances been found necessary, when the cause of the obstruction was evident, to cut the cord, a course of procedure which must recommend itself to the operator when the nature of the case is obvious. Caution should of course be exercised to prevent hæmorrhage from the cut vessels, by placing a ligature speedily on the umbilical side of the section; but it has been pointed out that a slight discharge is rather favourable in its effect than otherwise when asphyxia is threatened, a condition which may very probably be found to exist, along with the semi-apoplectic condition depending upon interruption to the circulation in the great vessels of the neck. In breech presentation, or after the performance of podalic version, the cord sometimes is found surrounding the trunk or entangled among the limbs, whence it will be proper to disengage it if possible, and, if this cannot be effected, to cut it, rather than run the risk of obstruction in what, for the child at least, is always a critical labour. After such cases, it is proper to introduce the hand into the vagina to ascertain that there is no inversion of the uterus, unless the state of the organ, as observed through the abdominal walls, is in all respects satisfactory.

Dorsal Displacement of Arm.—A rare and curious cause of obstructed labour has been shown by Sir James Simpson to arise from dorsal displacement of the arm. This may occur either in pelvic or cephalic presentations. In the former case, which is more frequent, it is probably due to an improper and imprudent dragging upon the limbs, the tendency of which is, as has already been observed, to allow the arm to pass up alongside of the head. If one or other arm should, in this process, get behind the head—as is still more likely to occur in unskilful turning—it is not difficult to understand how the arm may get behind the neck and beneath the occiput, and thus constitute an impediment of a very serious character, the limbs being so placed that

its reposition is a matter of no inconsiderable difficulty. The arm will, in such cases, generally lie against the symphysis pubis, and it will therefore only be practicable to dislodge it, if we can succeed in pushing the parts upwards, so as to leave sufficient room, between the occiput and the upper part of the symphysis, to admit of such manipulation as may effect our object. In Simpson's case, the presentation was one of the head, in which the arm had, in some peculiar way which it is difficult to understand, got on to the nape of the neck, and was thrown transversely across the pelvis. The course suggested by him for the management of such cases is to bring the arm down by the side of the head—as its complete reposition above the brim would probably be impossible—and allow labour to go on in this way, the presentation now being an ordinary head and arm case; but we are impressed with the idea that the mode of procedure adopted by Dr. Jardine Murray in similar circumstances, which simply consisted in turning, meets much more fully the difficulties of the case.

Thickness of Membranes.—There is but one other condition arising from the state of the ovum to which we think it necessary here to refer. This is unusual thickness and resistance of the membranes, which, sometimes, while things are otherwise going on favourably under efficient uterine contraction, absolutely stops the progress of the labour. It is needless to recapitulate what has already been said as to the management of the membranes, the only important point being that, before we decide on rupturing them, which will at once bring this difficulty to an end, we should be sure that the proper function of the membranes has been effected in producing dilatation of the os. No danger will accrue to the child, so long as the presence of the liquor amnii protects it from injurious pressure.

CHAPTER XXXVII.

UTERINE INERTIA AND PRECIPITATE LABOUR.

Irregularities in the Progress of Labour; often due to Intestinal Derangement.—INERTIA: *Influence of Temperament, Climate, Age, Emotion, Excessive Distension, Premature Rupture of the Membranes, &c.—Influence of Irregular Uterine Action: Classification: Different Grades and Varieties of Inertia.—Treatment of Inertia; if from Over-distension or Displacement of the Uterus; if from Intestinal Derangement: Various Modes of Exciting Reflex Uterine Energy: Stimulants as a rule to be avoided: Use of the Forceps in Inertia: Ergot; its Natural History, and Physiological Effects: Rules for its Use in Midwifery: Other Oxytocic Agents.*

PRECIPITATE LABOUR: *Causes obscure: Apparent Connection with Menstrual Excitement.—Labour may be Precipitate from Deficient Resistance.—Danger of Rupture and Laceration of the Uterus.—Tendency to Post-partum Hæmorrhage.—Treatment: Empty Bowels: Opium: Sources of Reflex Irritation to be carefully avoided.*

IN no two cases of labour is the course of the process precisely similar, although the vast majority are from first to last perfectly normal. Nothing is more familiar to the accoucheur than the sudden and unlooked for changes which occur in the course of an ordinary case. In one instance, the tardy and inefficient progress which has characterized it during many tedious hours gives place, without any very obvious reason, to efficient and even violent action, which brings the act to a precipitate termination; while, in another, the safe and steady progress which has led us confidently to anticipate a speedy issue of the case, is provokingly interrupted by a failure of expulsive power—and that too, not unfrequently, when the second stage of labour is nearly at an end. Such occurrences as these are generally of no great importance, and resolve themselves most frequently into a trial of patience, or a moment of hurry and excitement; but cases do now and again occur,

in which a failure of action, or violence of propulsive force, demands prompt and energetic attention.

It has very frequently been observed that, in these matters, much depends upon the temperament and constitution of the mother, so that, in members of the same family, in persons of similar temperament or constitutional power, and to some extent in those of similar social position, there will often be observed a certain resemblance in the character and progress of the labour. In some cases, in which the balance between power and resistance is in any way disturbed, it would almost appear as if nature availed herself of some special compensating condition which the exigencies of the case had called into play. The woman, for example, whose health has been impaired by chronic disease, or in whom the constitutional vigour and tone is naturally feeble, has as a rule comparatively weak uterine action, and always deficient voluntary force; still the labour runs a normal course, for the want of tone in nerve and fibre favours relaxation of the parts, and thus, proportionately and in a compensatory manner, diminishes the resistance. In women, moreover, of this temperament, the anatomical peculiarities of the sex are generally well marked, and the ample and shallow pelvis thus offers a comparatively trifling resistance to the passage of the child. If, however, we contrast with this the tall, vigorous and muscular woman, we find that in the latter there is a very general tendency to the male type of pelvis, involving a tardy passage of the child through the pelvic canal. May we not infer that it is in some degree in compensation for this that she is furnished with muscles so powerful and constitutional vigour so marked, to enable her to overcome the greater resistance which in a feebler frame would constitute an insurmountable barrier?

There are many morbid conditions which exercise an influence more or less marked on the progress of parturition, to which we have had occasion more particularly to refer. We may here mention one cause, in regard to which no doubt can possibly be entertained, as leading both to tardy and precipitate action on the part of the expelling powers. This is the condition of the intestinal canal, any irritation of which may not only excite powerful reflex contraction, but may cause irregular uterine action, and, in other cases, may arrest it altogether; this being one of many reasons why tardy and precipitate labours are always considered together. An attentive observation, from a physiological point of view, of the phenomena which accompany parturition, and more particularly of the nervi-motor action of the uterus, will suffice clearly to show that there are many different ways whereby the forces upon which the act of birth depends may be disturbed or thrown

out of gear, with the result, in one class of cases, of a labour which is too rapid to be safe, and, in another, of an arrest in the process which may prove a source of danger to the mother as well as to the child. It is, indeed, upon a correct appreciation of the physiological phenomena referred to, that a sound and judicious treatment can alone be based.

Uterine Inertia.—It will be inferred from what has just been said that, in some constitutions, there is a natural tendency to tedious labour by reason of a deficiency in the expelling power. Within certain reasonable limits, this calls for no treatment and is attended with no risk, but, when these limits are exceeded, the case is to be considered as abnormal. Besides general debility, from whatever cause arising, there are other conditions which have been observed to increase the liability to inefficient uterine and expulsive action. Thus, climate and season exercise an influence which, although far from uniform, is sometimes obvious, the relaxing effect of a high temperature, in those instances, enfeebling the nervous and muscular tone, and it has even been stated that the result of long residence in the tropics has a permanently enervating effect, which may be manifested subsequently in temperate latitudes. Another cause is sometimes found to exist in the age of the woman, and in cases of precocious pregnancy this is occasionally very distinct. In women, again, who become pregnant for the first time in advanced life, it is well known that labour as a rule is tardy, and, although the idea usually entertained is that this is due mainly to increased anatomical resistance, there can be no doubt that, in a certain proportion of cases, it depends upon deficient force.

In those who have borne many children in rapid succession, the action of the uterus is often found to become enfeebled towards the close of the child-bearing epoch, probably because the organ has not had sufficient time for rest, and for the gradual development of those structural changes which succeed delivery, during and after the period of involution. The influence of emotional causes, although marked, is generally temporary, as is often seen on the arrival of the accoucheur, when it arises from fear. Any sudden alarm, startling intelligence, or anything which may give rise to sudden emotion, may produce precisely the same effect, and although, as a rule, the uterus in such cases will, after an uncertain interval, resume its function, it occasionally happens that the pause is so long, or occurs at such a critical period in the labour, that it is necessary to have recourse to art to expedite or complete the delivery. The various displacements of the uterus, which act by altering the axis of expulsion, are often considered under this head, but that, which is a purely mechanical cause of delay, has already been referred to in a previous chapter. What is here implied by inert

labour, has reference exclusively to a faulty condition of the expulsive forces, in which they are abnormally feeble and inefficient; and this feebleness of contraction may either exist throughout the whole period of labour, or may come on, more or less abruptly, in the course of a case which had, up to that time, progressed in a manner leaving nothing to be desired.

Causes.—The causes upon which a failure of uterine action depends embrace, in addition to those above mentioned, certain conditions of the parts, more or less strictly morbid. To these attention must be given, as it is manifest that a mere routine treatment, adopted without an intelligent reference to the circumstances of the case, must necessarily often fail of its object, and may sometimes only tend to make matters worse. Excessive distension of the uterus, by thinning the walls of the organ beyond ordinary limits, is one of the conditions to which we refer. The effect of dropsy of the amnion, for example, may in this way interfere with the due action of the organ, and, in such a case, less good will be derived from the exhibition of agents which excite the uterus to contract, than from rupturing the membranes, and thus allowing the uterine wall to come into contact with the surface of the child, when it will in all probability be roused to active energy.

The death of the child was believed by Baudelocque to weaken materially the uterine contractions; but Dubois asserts, and modern accoucheurs generally agree with him, that when the woman is in good health, the death of the child exercises no influence whatever in the way of enfeebling uterine action, and that if it sometimes happens that labour goes on more slowly when the child has ceased to live, this is to be accounted for by the fact that the death of the child is probably the result of some disease of which the mother has been the subject, and that, consequently, her forces have already been weakened. The premature rupture of the membranes, and consequent discharge of the waters, very often causes a tardy labour, but this operates chiefly in the first stage, and is mainly due to want of the mechanical dilating power of the bag of membranes. Inefficient uterine action has often been observed to be associated with undoubted morbid conditions of the organ. Among these may be mentioned rheumatism, gout, and neuralgia, and, in addition, congestion and inflammation of the uterus. In so far as congestion and inflammation are concerned, while their occasional existence cannot be disputed, there can, we imagine, be little doubt that the older writers greatly exaggerated their importance and frequency, as an excuse for the never-failing remedy of the lancet. A morbid condition, however, of the uterine fibre, depending upon some form of uterine inflammation, is a possible, and we would venture to

say a probable, cause of some of the most complete cases of uterine inertia.

A distended bladder or rectum may, in addition to the mechanical impediment which it constitutes, act injuriously in arresting uterine action; and it has been observed, in those cases in which pressure on the sacral nerves causes cramps in the lower limbs, and the excessive agony to which these give rise, that the effect on the uterus is to weaken and not to increase its action. Several cases of this kind are cited by Meigs.

Another effect which is occasionally produced is irregular action, in which the whole of the organ is not symmetrically contracted. Irregular contractions, as we have already seen, give rise to retention of the placenta, hour-glass contraction, and inversion of the uterus; and, in like manner, they necessarily occasion pains which are inefficient, inasmuch as they do not act upon the whole circumference of the ovum. In such cases, the pains are more irregular in their occurrence, and the suffering, which is severe, is referred at one time to one part of the uterus, and again to another. Sometimes, the hand placed over the abdomen can detect inequality on the surface of the contracting organ, showing what parts are in action and what parts are paralyzed. Under the influence of contractions such as these, labour makes little or no progress, the bag of membranes does not project in the usual way during a pain; or, if the second stage has been reached, the presenting part of the child makes no advance. The woman now becomes exhausted, the pulse frequent, and the case may assume a grave aspect. It is to the more serious forms of this that the name of "uterine tetanus" has been given.

Classification.—Inefficient uterine action being thus found to depend upon such a variety of causes, it is not to be wondered at that attempts have been made to classify the cases. Wigand proposed to divide all into three groups. In the first, the womb contracts, not only quite regularly, but even to such an extent that the child is bent forwards at each pain, and the labour has in general an otherwise normal course; but this course is very tedious, and the pains are interrupted by too long intervals. This he calls *Inertia Uteri.* In the second grade, which he describes as *Adynamia* or *Atonia Uteri,* the uterus also contracts in a manner which is, so far, quite regular, but the contraction is incomplete, of short duration, and inefficient, and lasts longer at the fundus than in the lower segment of the organ. In the third grade, all pain in the uterus has ceased, so that, beyond a certain feeble tension, no trace of contraction is to be observed: this condition Wigand describes as *Lassitudo,*

Exhaustio, or *Paralysis Uteri*. Scanzoni proposes that we should draw a distinction only between "primary" and "secondary" inefficient action, including, under the first term, all cases in which, from first to last, the womb lacks sufficient energy to complete the labour without assistance; and, under the second, those cases in which the contractions were originally sufficient, but have failed in the course of labour, so that, in the end, all the symptoms of primary inertia are manifested.

We doubt much whether any such system of classification is of value, either as a guide to practice or in elucidating the subject; and we therefore prefer, as embracing all cases of failure of uterine action, the simple term Inertia, which is generally used in this sense by English writers. Obviously, however, this may exist in any grade, from mere feebleness of contraction to absolute paralysis of the uterus. It is proper, in considering this subject, not to overlook the possibility of failure in the auxiliary expulsive forces; for it must be obvious that, in the course of the second stage, anything which may prevent the efficient action of the expiratory muscles must of necessity interfere, more or less, with the act of parturition. Acute or chronic pulmonary disease, therefore, as well as cardiac or hepatic disorders, and the ascites which often accompanies them, may, with other abnormal conditions, so interfere with the dynamical phenomena of parturition as very seriously to retard the progress of labour.

Treatment.—A careful consideration of the circumstances above mentioned, as applicable to individual instances, will always be our best guide to the treatment of those cases in which there is a failure of the *vis a tergo*. An error in the axis of expulsion, which is usually dependent on anteversion of the gravid uterus, and therefore does not strictly fall under our notice here, may be managed without difficulty, under ordinary circumstances, by postural treatment, or by the abdominal bandage, so as to bring the axis of the uterus as nearly as may be possible, into coincidence with that of the pelvic brim. Over-distension of the uterine cavity, by reason of dropsy of the amnion, plural pregnancy, or any other cause, should, if symptoms of inertia develop themselves, be treated by rupture of the membranes—and that for reasons which have already been stated.

Although, perhaps, rheumatism of the uterus has been somewhat exaggerated as regards its importance as a cause of retarded labour, the symptoms should always be taken into consideration, as they are such as may divert our attention from the inefficiency of the labour. Those symptoms have been well described by the younger Naegele. "Rheumatism of the uterus," he says, "is recognised by the following signs. During labour, and often before it, the uterus is unusually

sensitive to contact, both from without and from within. The contractions are feeble, short, infrequent, and unusually painful, and, in fact, excite as much suffering at their commencement as normal pains do at the height of the contraction. During the interval between the contractions, the pain does not cease. The woman complains of heat, great thirst, and uneasiness; the pulse is rapid, small and hard. In the course of labour, the suffering from the pains increases, in proportion as their efficiency diminishes. In favourable cases, the pain ceases for a time, the patient falls asleep, after which regular pains soon recur, and continue until the completion of the labour; but, when the case is mistaken or unskilfully treated, the labour becomes extremely protracted, debility and cramp come on, and rheumatism passes into metritis."

In a large proportion of cases, as we have seen, the cause of the failure of uterine action is to be found in the condition of the alimentary canal, and, on that account, one of the first points that we should attend to in all cases, is the condition of the *primæ viæ*. In like manner, and for similar reasons, it is always advisable to ascertain the condition of the bladder, which sometimes exercises a scarcely less important influence on the progress of the case. The effect of relieving a distended or irritated viscus is often so striking, that a very common and frequently efficient mode of treatment, in cases of uterine inertia, is to throw an enema of a stimulating character into the rectum; and, in fact, so susceptible is the uterus, even in these cases, to reflex irritation, that a simple enema of warm water will often suffice to awaken its dormant energy.

The action of the organ may also be roused by other expedients of a still more simple character. A warm diluent drink is often found to have an effect as marked as an enema, and, when the strength has become in any way exhausted, it will be proper to substitute for this strong soup, or even some form of stimulant. The accoucheur can scarcely, however, be too cautious in sanctioning the use of stimulants in labour. Among the lower classes—where strong stimulants seem to constitute the trusted panacea for all evil—it will often be impossible to prevent their employment; but the universal opinion of all who have witnessed the indiscriminate administration of stimulants in labour is that the effect, as a rule, is to retard and not to advance the period of delivery. The reflex activity of the uterus is often aroused by digital examinations, which seem to excite the nerves of the cervix, or those which are distributed in some abundance to the tissues of the perineum. Free examination of those parts, therefore, which, under ordinary circumstances, is to be condemned, may here be practised without

hesitation, should the uterus show any symptoms of response, a result which will be further encouraged by firm pressure over the surface of the abdomen.

The position or posture of the woman often exercises, at all stages of labour, a very decided effect on the vigour and efficiency of the pains; and, in a woman in whom there is an evident tendency on the part of the uterus to flag in its efforts, the erect posture, by permitting the child to gravitate towards the lower segment, has often a most beneficial effect, so that it is proper in these cases to cause the woman to walk about the room, even at an advanced stage of labour, in the hope that this result may ensue. An abdominal bandage, properly applied, will frequently be found to contribute much both to the comfort of the woman and the efficiency of the pains, on account of the pressure which is thus exercised upon the uterine walls, the stimulus which is afforded to the muscular fibres, and the increased efficiency with which the abdominal muscles are enabled to act. In the same manner, no inconsiderable assistance may often be afforded by firm pressure exercised, during a pain, by the palm of the hand placed over the abdomen. The effect, indeed, of pressure of this kind is often very striking, so much so that of late years general attention has been directed to this method of treatment as a substitute for the ordinary oxytocics. When a tendency to inertia exists, something will usually be effected by carefully watching the course of labour, encouraging the woman to husband her efforts in the first stage, and urging her to make full use, during the second stage, of the expiratory muscles, by closing the glottis, fixing the limbs, and abstaining from crying during the presence of the pains.

In a certain number of cases, however, the uterus sinks into a state of complete inertia, or the pains become so feeble that it is evident that labour cannot be completed by the unaided powers of nature. This condition is one which is often attended with no inconsiderable amount of risk both to mother and child. If the failure should occur in the early stage of labour, before dilatation of the os has been effected or the head has descended into the pelvis, we may place more confidence in nature, and may wait for a reasonable time, in the expectation that more efficient action will be set up; or we may employ the more simple means which have been detailed, with the view of stimulating the uterine fibres to contract. When the os is fully dilated, or even, as we have seen, at an earlier stage, when we have reason to believe that there is dropsy of the amnion, rupture of the membranes is a perfectly proper and justifiable procedure, and will often be followed, after a brief interval, by vigorous contraction. Should this fail, or should the

inertia have become developed in the course of the second stage, we have then to choose between the forceps or some other mode of operative delivery, and the oxytocic agents, of which the ergot of rye is by far the most important.

Forceps.—When the head is low, and the conditions otherwise are such as to render the operation both easy and safe, the forceps should, in almost all instances, be preferred; and, in all cases in which the circumstances are such as to call for a speedy delivery, we should have recourse to this operation, or to turning. But, when the head is high in the pelvis, and there is no obvious necessity for rapid delivery, we may resort to some of the agents referred to.

Use of Ergot.—Ergot, which is, as we have said, the most familiar of the class of drugs to which we refer, is to the accoucheur an agent so important and so powerful, that we may here interpolate a brief account of it, and of the rules which should guide us in its employment in the exigencies of ordinary practice. "The Ergot, or Spur," says Christison, "seems to affect occasionally all the Graminaceæ, more rarely the Cyperaceæ, and sometimes even the Palms. No plant, however, presents it so frequently, or of such size, as common rye—the *Secale Cereale.* It is generally thought to arise under the influence of undue moisture; and although this condition seems not to be absolutely essential, it is never produced with such certainty as in wet seasons, and in districts where the soil is damp, rain frequent, and the atmosphere still and misty, especially at the time the grain is coming into flower. In these circumstances, it is produced, according to some, by punctures made by insects in the glumes, while the substance of the seed is pulpy; others conceive that it is caused by the spawn, or sporidia, of a peculiar species of fungus." The Ergot of Rye is an irregularly cylindrical body, averaging about an inch in length, and slightly curved, like the spur of a cock—hence the name "Spurred-Rye." It has a very powerful toxic action, and gives rise, when taken in large quantity, or for a considerable time, to two classes of symptoms —convulsive and gangrenous. It produces, as has been demonstrated by Dr. Brown-Séquard, an influence on the vaso-motor nerves, and thus causes contraction of the vessels of the spinal cord, on which account it is frequently used in congestive and inflammatory affections of that structure. There can be no doubt that it is through that channel that its specific action on the uterus is produced; and it unquestionably is the most certain in its action of all the agents hitherto discovered in promoting the contraction of the muscular fibres.

Its action may always be counted upon with more certainty when the uterus is fully developed; so that, in abortion, it cannot be de-

pended upon, as likely to promote the expulsion of the ovum, with anything approaching to the certainty with which, towards the end of pregnancy, the uterus responds to its action. Still, although thus comparatively inefficient, there are no circumstances under which its action on the uterus may not be manifested, so that we not only find it sometimes to act with unexpected vigour in the expulsion of an early embryo, but even in the unimpregnated organ in the treatment of menorrhagia; and it has occurred to us more than once to be able to demonstrate the uterine nature of a doubtful abdominal tumour by the contractions produced in it by the action of several doses of ergot. It is, however, when labour has actually commenced that the action of ergot is most marked, but there can be no doubt that, under other circumstances, it operates, although with less certainty, in inducing abortion or premature labour, or otherwise initiating uterine action.

The physiological effects of the drug are, of course, of great interest to the accoucheur. We may here pass over, as foreign to our subject, its more important toxic effects; but we may note that it has frequently been observed to produce nausea and vomiting, when it has been given in the form of enema with perfect success. Subcutaneous injection of ergotine has of late been extensively practised, chiefly in the treatment of uterine myomata. The usual effect of ergot on the circulation is a diminution both in the frequency and fulness of the pulse, sometimes accompanied with faintness and pallor. In some instances, symptoms of cerebral disorder manifest themselves in the form of weight and pain in the head, giddiness, delirium, dilatation of the pupil, and stupor, but these symptoms commonly follow the uterine contractions, and are usually observed in those cases in which an unnecessarily large quantity of the drug has been administered. That such symptoms may be manifested is enough to show that ergot is always to be used with some caution.

Its action on the uterus, with which we have more particularly to do, is generally observed in from ten to fifteen minutes after the medicine has been taken, and is indicated by an increase in the violence and duration of the pains. When the full effect of the drug has been produced, the pains are quite different from those of normal labour, inasmuch as they are absolutely continuous, or are at least without any proper interval, although there may be irregular periods of remission. This uninterrupted contraction of the uterine tissue necessarily involves a certain interference with the utero-placental circulation, over and above what occurs in the rhythmical contraction of ordinary labour; and it must be admitted that the absence of the natural periods of uterine rest may, if long-continued, place the life of the child in peculiar

jeopardy. This, however, has, we believe, been greatly exaggerated. "The ergot," says Dr. Hosack, "has been called, in some of the books, from its effects in hastening labour, the *pulvis ad partum;* as it regards the child, it may, with almost equal truth, be denominated the *pulvis ad mortem:* for I believe its operation, when sufficient to expel the child, in cases where nature is alone unequal to the task, is to produce so violent a contraction of the womb, and consequent convolution and compression of the uterine vessels, as very much to impede, if not totally to interrupt, the circulation between the mother and the child." This assertion has been satisfactorily refuted by Chapman, Dewees, and others; but still we are inclined to think there is some grain of truth in it—at least in those cases in which labour is protracted in spite of strong and unceasing pains. Dr. F. H. Ramsbotham supposed that the toxic action of the drug might be extended from the mother to the fœtus, and the figures which he gives would seem to go some way to prove his assertion. Of thirty-six cases in which he induced premature labour by puncturing the membranes, twenty-one children were born alive; while in twenty-six cases in which labour was induced by ergot alone, twelve children only were born alive. Apart from the fact that such statistics are open to many fallacies, we repeat our conviction that the danger of ergot to the child has been greatly exaggerated; and we believe that the unsatisfactory results which have been reported have been mainly due to the rash administration of the drug, without any reference to the conditions upon which alone we can rely for a satisfactory result.

The violence of the contractions produced by ergot is such that we are never safe in administering it, unless we are convinced that the anatomical conditions are such as to admit of the passage of the child without extreme or unusual resistance. To give ergot, therefore, in a case of shoulder presentation or of deformed pelvis, when the os is undilated, or when the soft parts generally are rigid, dry, and undilatable, is manifestly wrong, and, in the first two cases, would amount to malapraxis in the worst form. As regards the condition of the os, the rule is as stated, but is not so absolute. If it were so, it would debar us from making use of ergot in the induction of premature labour, where its action initiates the commencement of the first stage. Nor, as regards ordinary cases, are we to admit that we must always wait until the os has become dilated, for there are instances in which a dilatable state of the os, with a properly lubricated condition of the passages, would be quite sufficient warrant, in the absence of all action, for the administration of ergot. If labour should become arrested before the os has opened to some extent, there can be no question of medicinal

treatment, as there is no risk either to mother or child in the arrest of a labour which has as yet barely begun. When the head is low in the pelvis, the forceps, as already remarked, will usually be preferred; and, if any delay should arise after the exhibition of ergot, the head being well in the pelvis, it may be proper to complete the delivery by instrumental aid. Indeed, we believe that the number of cases in which the two may with propriety be combined is larger than is generally believed. The objection to the forceps, in the case of an absolutely inert uterus, is that we may empty the organ, which then, contracting imperfectly, admits of alarming or fatal hæmorrhage; but if we combine the two, the one force will not only aid the other, but the ergot will ensure safety after delivery by maintaining the womb in a proper state of tonic contraction. If the contractions are violent, speedy delivery is always to be desired, as a considerable number of cases of rupture of the uterus are on record from the use of ergot alone.

The mode in which ergot was formerly administered was in the form of infusion. Two drachms of fresh ergot coarsely crushed may be infused for twenty minutes in six ounces of boiling water; one fourth of the infusion to be given at intervals of ten or fifteen minutes until distinct uterine action is manifested. If, with the second or third dose, the desired effect is already produced, it is wrong to proceed further, for the result of more than is necessary will only be to increase the tetanic character of the contractions and the risk both to mother and child. If the quantity above mentioned has been given in four doses without any response on the part of the uterus, it will be needless, and indeed improper, to pursue the treatment further, and cases do, not unfrequently, occur, in which the drug seems to be absolutely inert. The infusion should always be freshly made; but the great objection to it is that one cannot be sure of the quality of the ergot, more especially if it has been kept for any time, when it is apt to become mouldy, or to be entirely destroyed by an acarus which feeds upon it and leaves the grain as a mere shell. All these difficulties are got rid of by the use of the Liquid Extract or the Tincture of the British Pharmacopœia, either of which may be given in doses of twenty or thirty minims for three or four times and at the same intervals as the infusion. Schacht's "Liquor Secalis" also contains the active principle of the drug, and may be given in drachm doses; but the liquid extract is the preparation which we can with the greatest confidence recommend, as we have had more experience in its use.

Ergot was used by women for hurrying labour long before it was known to the profession, and the same remark may be made of Borax,

which was used by the ancients, and has been much employed in Germany by some in preference to ergot, being supposed to be free from the objections which attach to ergot as a toxic agent. Cinnamon, Strychnia, and Quinine have also been employed, as well as numerous other drugs. A very thorough trial has also been made of galvanism, which, although it has an undoubted effect upon the uterine fibre, is certainly less to be depended on than ergot, and has therefore fallen almost entirely into disuse.

It has often been stated that the various agents of this class should not be made use of in the case of primiparæ; but, to the judicious practitioner, such a rule is quite unnecessary, as he will not fail to take into consideration the greater resistance which naturally obtains in the case of a first labour. There is, in fact, if he does not lose sight of the special conditions referred to, no reason why he should not avail himself of the action of the oxytocic agents in primiparæ as well as in pluriparæ. For the guidance of the inexperienced practitioner, we will add one caution only—that he should not be too eager in his endeavours to bring a case to a speedy termination; for it often happens that a sudden cessation of the uterine efforts is merely an indication that the organ is collecting itself for more vigorous action and a final effort.

Precipitate Labour.—Although of less frequent occurrence than failure of the expulsive force, the accidents which may accrue in labours which are too rapid are scarcely less serious. In the great majority of all such cases, there is some peculiarity of constitution or temperament. It has, indeed, not unfrequently been observed in the same patient in successive pregnancies, and even in different members of the same family. It would also appear to be occasionally connected with a morbid irritability of the generative system, which may have been previously manifested in undue excitement at the menstrual periods. In some extreme instances, the action, from the very commencement of labour, is so severe that the patient is compelled to bear down from the first. The appearance and expression of the countenance, and the state of the pulse, denote a condition of excitement and suffering which is quite abnormal, and, in such instances, we may with some reason dread the occurrence of uterine rupture at a stage when we are comparatively powerless to avert it. The pains are almost continuous, and, if the parts are relaxed, the child may be forced through the passage with a rapidity which is almost appalling. In such instances, indeed, when the woman is taken unawares, the child may be born while she is yet in the erect posture, and dashed upon the floor.

Causes.—Although, as we have seen, the usual effect of premature rupture of the membranes is to retard labour, the contact of the uterine

walls with the surface of the child has occasionally the effect of rousing the organ to action of the most violent and uncontrollable kind, although the parts may as yet be but imperfectly prepared for the stage of expulsion. Emotional causes of various kinds may also have a similar effect in producing contractions of such energy as to bring the labour to a termination with unexpected rapidity. In some cases, the operation of these causes is obviously beneficial, and the mere suggestion of operative interference, or the production of the forceps, will sometimes have the effect of rousing the flagging energy of the expulsive forces, and bringing matters to a termination before operative measures have been resorted to. Scarlatina, relapsing fever, and other acute febrile disorders have, in some instances, a precisely similar effect.

In another class of cases, the rapidity of the labour seems to be due, less to the violence of the pains than to the deficiency of the resistance to the passage of the child through the parturient canal. In the case of a pelvis of unusual size, this may take place, even although the pains are in no way beyond the average; and, of course, if such an anatomical condition as this is combined with violent uterine action, the rapidity of the delivery may be such that only a few minutes intervene between the preliminary pains and the termination of labour. If the head is smaller or more yielding than usual, or the soft parts more than ordinarily dilatable, these conditions will also contribute to a similar result.

Special Dangers.—The dangers attendant upon precipitate labour are various. The extreme violence of the contraction may cause rupture of the uterus; or the rapid passage of the child may cause laceration of the cervix, vagina, or perineum, and the more remote dangers to which these accidents give rise. In other cases, the uncontrollable violence of the expulsive action of the voluntary muscles (which in such a case become virtually involuntary) may force the air into the cellular tissue, and cause emphysema of the face and neck. The sudden emptying of the uterus may be followed by a period of complete relaxation, so that all such cases are known to be peculiarly liable to post-partum hæmorrhage. Rupture of the membranes only makes matters worse, and the direct pressure to which, in such cases, the child is subjected, exposes it also to no inconsiderable risk.

Another danger to the child arises from the risk of delivery taking place when the woman is in the erect posture, when it may be seriously injured by being dashed upon the floor. The rupture of the cord, which would probably occur under such circumstances, is not, as some have supposed, an important source of danger, seeing that laceration of the

vessels, which must under such circumstances take place, is in itself an efficient protection against hæmorrhage. It has been observed, in cases in which the resistance was much less than the expulsive force, that the uterus, in its undilated condition, has been forced down upon the perineum, and has even protruded externally before the os had sufficiently yielded to permit of the passage of the child.

Treatment.—The treatment of precipitate labour consists in adopting such measures as are available for moderating the violence of the uterine action. As a considerable number of cases are associated with some intestinal derangement, it is proper, in the first instance, to wash out the bowels by a simple injection of tepid water, the soothing effect of which will sometimes become at once apparent. But if, as is more likely, the turbulence of the uterine action still continues, nothing is so likely to produce a decided effect as opium, given in the form of a suppository of one of the salts of morphia. This is better than the exhibition of any of the preparations of the drug by the mouth, more especially if there is a tendency to irritability of the stomach. The other sedatives have a similar, although less certain, effect, and, in many cases, the result of chloroform inhalation is wonderfully to moderate the uterine action.

A knowledge of the physiology of the expulsive forces will instinctively guide us to such management of the case as may obviate, as far as possible, any voluntary action. Everything, therefore, which the woman might seize, or anything against which she could press her feet, should be carefully removed, while the action of the pain should be watched, and the woman encouraged to cry out lustily rather than to fix the glottis. Such modes of treatment as we have shown to be useful in inertia, should here be scrupulously avoided, and a directly contrary plan adopted. We should carefully avoid, therefore, digital examinations, beyond what may be considered absolutely necessary, and protect the patient from all sources of mental emotion or physical excitement, and from any other cause which experience has proved to exercise a decided influence upon the uterine fibre. On no account should the woman be allowed to assume or maintain the erect posture, which is well known to act as a fresh incentive to uterine action by allowing the child to gravitate downwards and press against the os and cervix. Although, theoretically, we might naturally suppose that the ordinary abdominal bandage would rather encourage than abate uterine action, it has been found that it sometimes has a soothing effect, adding to the comfort of the patient, and in some degree relieving her suffering. Should this expedient be tried, it will be well so to adjust the bandage as to support the womb by

pressure, applied chiefly between the lumbar and hypogastric regions. When procidentia is threatened, it may be necessary to support the uterus by means of a bandage applied externally, and so adjusted as to press against the vulva. When the lower segment actually protrudes, a hole should be made in the bandage so as to aid the longitudinal fibres of the uterus in mechanically overcoming the resistance of the circular fibres and tissues of the os. Naegele operated successfully in this way, allowing the child to be born actually through the aperture in the supporting bandage.

In cases of violent and precipitate labour, the fearful exertion to which the patient is impelled may culminate in an epileptic seizure, or even in apoplexy. In some cases, the suffering is so great and so continuous, and the woman is worked up into such a state of frenzied excitement that, at the moment of delivery, she is actually unconscious of what she does. It is in consideration of this that the Continental codes look with leniency upon child murder perpetrated under such circumstances, and probably, even in our own country, if such facts were substantiated, the law would take a similarly lenient view, although it is not set forth in the statute-book. Another question in medical jurisprudence, and one which may have an important bearing on cases of suspected infanticide, is the likelihood of the mere rapidity of the birth being the cause of death of the child, as cases are recorded in which children have been born while the woman was in the erect posture, or even when she was at stool. It would appear, also, that sometimes, owing possibly to the great cerebral excitement, there is a greater tendency to the occurrence of puerperal mania, in women in whom the symptoms, during labour, have been of the nature of those above described.

CHAPTER XXXVIII.

THE PUERPERAL STATE: LACTATION.

Management of the Puerperal State.—Laxatives.—The Lochia: Nature and Source of.—After-Pains: Treatment of.—The Lacteal Secretion: Milk Fever: Colostrum: The Child to be put to the Breast at Fixed Intervals: Agalactia: Galactorrhœa; Two varieties of.—Management of Lactation: Effects of Over-Feeding.—Duration of Lactation.—Effects of Menstruation and Pregnancy upon Lactation.—Inflammation and Abscess of the Mamma: Effects of: Treatment.—Excoriation and Fissure of the Nipples: Prevention of: Treatment of.

THE management of labour, up to the stage when the accoucheur is able to leave his patient after her delivery, has already been described in a previous chapter. We now propose, however, to consider, somewhat more in detail, the treatment of the woman during the puerperal state—while she is under the influence of conditions which, although strictly physiological, may very readily become morbid. The condition of the woman during the period immediately succeeding the termination of labour is one of delightful calm and repose, which offers a remarkable contrast to the excitement and frenzy of the concluding stage of the process. The falling of the pulse shows the subsidence of a turbulent circulation, and is due, in some degree, to a modified shock. When labour has been easy, and of moderate duration, there are no symptoms of shock; but, in other cases, and in proportion to the violence and duration of the process, the patient shows symptoms, more or less distinct, of debility, and the shock to the nervous system manifests itself further by intolerance of light and sound, and other symptoms of temporary exhaustion. Perfect quiet, and, above all things, refreshing sleep, will speedily rouse the woman from the condition into which she has fallen; and so important, indeed, is the latter point, that many experienced practitioners were in the habit of giving an opiate, as a matter of routine, shortly after delivery. In

ordinary cases, however, opium is unnecessary; but, when there is shock and marked exhaustion, a moderate dose of the Liquor Opii Sedativus may frequently be given with advantage.

The old method of treatment by starvation during the first few days —when the diet was confined to tea, water-gruel, or arrowroot—finds few, if any, supporters at the present time. Nothing, indeed, could be more irrational than such treatment, or more likely to retard recovery and discourage the lacteal secretion, so that it will be quite proper, after the first day at least, in the great majority of instances in which the patient has had some sleep, to give chicken-soup, or beef-tea, in addition to the dry toast, gruel, arrowroot, and sago, which are properly given at this stage, as being substances easy of digestion.

In the course of his subsequent visits, the accoucheur should see that the bandage is properly managed, and tightened from day to day; and it is well, by firm and equable pressure, exercised over the hypogastric region—which has often the effect of dislodging clots—to be assured of the satisfactory state of the uterus as regards contraction. One of the first points to which he addresses his inquiries is with reference to the function of the bladder, which is sometimes resumed with difficulty. Laving with warm water will usually be all that is required to excite the bladder to contraction; but, in some cases in which the labour has been difficult, the viscus is actually paralyzed, so as to require the use of the catheter, which may have to be repeated for several days.

Laxatives.—If the bowels have been freely moved, as they should always be, shortly before delivery, we need pay no attention whatever to that function until at least forty-eight hours have elapsed. Torpor of the bowels is, after labour, an almost invariable condition, which is probably due, as Dr. Tyler Smith says, to "the exhaustion induced by labour in all the organs under the influence of the spinal cord." Under the ordinary conditions of the puerperal state, it is, therefore, necessary to give some laxative medicine—of which class of remedies, castor oil is probably the best. Other laxatives may, no doubt, act with equal efficiency; but, as a rule, and especially in the form of pill, they are not to be depended upon. It is somewhat remarkable that, sluggish as the bowels are, they respond very readily to the action of laxatives, even in the case of those who are habitually costive. It will therefore rarely be found necessary to prescribe more than a dessert spoonful of castor oil, which may be given with lemon juice early in the morning. On several occasions we have seen an ordinary dose of half an ounce followed by such violent action as to require opiates to restrain the purging.

The Lochia.—While the placenta, during the third stage of labour,

is being separated and expelled, a considerable amount of hæmorrhage naturally takes place, and, after the completion of the process, blood continues to ooze from the ruptured and partially closed vessels on the inner surface of the womb. Efficient and rhythmical contraction of the uterus prevents the flow from becoming so profuse as to be dangerous, but a certain amount of discharge still goes on for a time. Indeed, it is well known that the maintenance of this discharge, for a certain time after delivery, is, to some extent, a guarantee of the favourable progress of the case, while, on the other hand, its premature arrestment is an almost invariable accompaniment of the more serious puerperal disorders, and is therefore always looked upon with more or less of apprehension. In order to understand the true nature of the lochial discharge, it is necessary to consider for a moment the anatomical condition of the parts from whence it springs.

That part of the uterus from which the placenta has been separated was compared by Harvey to the stump of a limb after amputation, but, although the simile has been frequently repeated, physiologists are well aware that it is only to a limited extent correct. The vessels, no doubt, are torn across in the course of the separation of the placenta, but, with this exception, there is no real breech of tissue, as nature has for many weeks been preparing for the process of separation. At birth, the inter-utero-placental tissue divides into two layers, as was formerly explained, one of these remaining adherent to the uterine wall, along with portions of the decidua serotina. If the womb be examined shortly after delivery, that part of it to which the placenta was attached will be observed to be thicker than the other portions, and projecting somewhat into the cavity of the uterus. Upon this surface, which is rugged and unequal, small clots, projecting from the orifices of the closed vessels, and so contributing to their efficient closure, are observed, along with shreds of membrane; and, over the whole inner surface of the cavity of the organ, remains of the decidua vera or of the subjacent textures from which it has been stripped are clearly to be made out. The discharge, then, which constitutes the lochia is, in the first instance, composed of almost pure blood. After this, it is still sanguineous, but has been found by M. Robin to contain an usually large proportion of white corpuscles. As the discharge changes in character, the proportion of white corpuscles becomes higher and higher, and these are believed by the same authority to have their origin directly in the inner surface of the uterus. This increase in the number of white corpuscles usually becomes manifest after the second day, and is accompanied by a proportional diminution of the red corpuscles. The discharge gradually assumes a reddish grey, and then a greenish or

yellowish hue, at which period there are scarcely any red corpuscles to be found. The white cells are, however, the predominating element, and some of them may now be observed to have become voluminous and full of fatty granules, having in fact assumed the characters which have gained for them the name of "granular globules." Along with these elements will be found fragmentary traces of the decidua, and also pavement epithelium from the mucous membrane of the vagina.

The lochial discharge has a peculiar odour, sometimes offensive in character, but at no time, if it follows a normal course, is there a purulent discharge, nor is the process really analogous to the suppuration which accompanies the reparative process of a healing stump. While the remains of the decidua are thus being separated, the small clots which plug the vessels, or are adherent to the surface, undergo a process of disintegration, and are separated along with the other constituents of the lochia. The new mucous membrane, which, according to Robin, begins to form beneath the decidua as early as the fourth month, is distinct about the ninth day, when the columnar epithelial cells begin to be developed. The surface then becomes smooth, and the discharge becomes colourless and finally ceases, these changes going on *pari passu* with the process of fatty degeneration of the muscular fibres which has been previously described.

Care should be taken by the nurse to promote, while avoiding unnecessary interference, the lochial discharge. A strict regard to cleanliness is the most important indication. The external parts are, with this view, to be sponged with a weak solution of carbolic acid or Condy's fluid, and the napkins changed as often as may be necessary; and, if the fœtor is unusually great, or if the parts have been lacerated, it is well to wash out the vagina daily, by a tepid injection, containing either of the ingredients above mentioned. The discharge is also promoted by the acts of defæcation and micturition, and by any change of posture; and it is a good practice, after the second day, if nothing should occur to contra-indicate such a procedure, to encourage the woman to make water on her knees, which permits of the escape of any portion of the fluid which may have accumulated in the upper part of the cavity of the vagina.

After Pains.—These are the natural accompaniments of the contractions which usually take place after labour, having for their object the expulsion of any clots that may be contained within the cavity of the uterus, and probably the expulsion of the clots which seal the vascular orifices. These after-pains are trifling or altogether absent in primiparæ, but are almost always present, in a greater or less degree,

in women who have previously borne children. Up to a certain point, they have a decidedly salutary effect, and contribute to the favourable progress of the case; but it not unfrequently happens, particularly in women who have had many children, that they are so severe as to cause much suffering and no little constitutional disturbance. Anything, in these cases, which tends to engender reflex uterine contraction will be pretty sure to aggravate the symptoms, so that vaginal examinations and irritation of the rectum and bladder should, as far as possible, be avoided or rectified. One of the most familiar causes of after-pains, so common as to have given rise to an aphorism among nurses, is the application of the child to the breast, and the accoucheur should generally avail himself of this well-known fact to ensure thorough and efficient uterine contraction. And we may here repeat what was stated on a previous occasion, that nothing tends so much to ensure that the after-pains shall be moderate in degree, as firm pressure on the fundus, with careful attention to the contraction of the uterus, during and after the expulsion of the placenta, and the complete removal of all clots and shreds of membrane from the os and cervix.

The after-pains usually commence soon after labour, and in bad cases they last for three or four days. In other cases, again, they are at first moderate, and, after some time, come on with great violence. If there be any suspicion of retained coagula, it will be proper to pass the finger into the vagina, and remove any clots which may be within reach. Should no such cause be discernible, and the pains still persist, the application of a warm poultice over the hypogaster, or a soothing injection into the vagina, will often suffice to allay the suffering, if not to cause perfect relief. In France, an ointment containing belladonna has been extensively used, and no doubt may be productive of benefit, but the objections to the general use of this drug have already been stated. In some instances, the pains are distinctly neuralgic, or are associated with a rheumatic condition of the uterus, and in those, as well as in all other cases in which the sufferings of the woman go beyond a certain point, and especially when they prevent sleep, opium may be given without hesitation, either by the mouth or by enema. It is well, however, before giving opium in any form, to be sure that there is no irritation of the bowel, from over-distension or any other cause, as it will be proper to relieve that condition before having recourse to sedatives. Dr. Tyler Smith found benefit occasionally to result from the application of an anodyne embrocation to the breasts. It must be clearly understood that after-pains, although due, in their usual form, to a physiological action, are, when severe, not to be neglected; for, not only may the want of sleep and constitutional irritation lead to un-

pleasant results, but the case, if abandoned to nature, may even pass into inflammatory disease, which, at this particular epoch, is, as we shall see, peculiarly disastrous in its effects.

Lactation.—The enlargement of the breasts, which is so characteristic a sign of pregnancy, is usually accompanied, not only with increased development of the mammary glands, but also, during the last few months of gestation, with a secretion of more or less milk. The quantity is, however, small, and, although it may, in some cases, be pressed out in jets from the nipple, there is seldom any great accumulation of the fluid in the ampullæ of the galactophorous ducts. In most women, no marked alteration takes place until about the third day, when the secretion of the milk—properly so-called—commences. At this time, there often is what women describe as a rush of milk to the breasts. The glands become considerably enlarged and greatly more vascular, and the pulse very commonly rises a little, when the mother may complain of headache. A febrile condition has indeed been described by the older writers as a normal accompaniment of the establishment of the secretion, but the constitutional symptoms to which the local determination of blood at this time gives rise can scarcely with propriety be described as a fever. This is true, at least, in regard to all ordinary cases; but it is by no means an unusual occurrence for the patient to be attacked with a rigor, which is generally slight, followed by heat of skin, rapid pulse and headache—symptoms which are relieved by free perspiration and a copious secretion of milk.

Milk Fever.—This is identical with what is commonly known as Ephemera or Weed. Whatever the degree of fever may be, the state of the breasts requires prompt attention. One of the advantages of putting the child early to the breast is that it draws out the nipple, which may be small or flat; and, what is now very likely to occur, should this have been omitted, is a projection of the areola, which participates in the tumefaction of the rest of the gland, so that the nipple falls in, as it were, on a level with the skin, when it becomes a matter of some difficulty for the child to seize it. Putting the child to the breast is the natural and almost instinctive method which the woman adopts for the relief of the painful distension which she experiences, but, as the child at first drinks but sparingly, it may be necessary for the nurse to relieve the gland by the use of the breast pump or otherwise, aided by gentle frictions with olive or camphorated oil. These may be directed more especially to such portions of the gland as may show a tendency to induration or knotting, due in the first instance to local accumulations of milk, and subsequently, if neglected, to inflammations of the surrounding tissues,

which may proceed to abscess. It is always of importance to keep the breasts cool at this stage, and it may even be necessary to keep down the temperature by evaporating lotions, when there is reason to apprehend the more violent action which is apt to culminate in abscess. No small amount of suffering arises in some instances from the weight of the inflamed gland, which gives rise to dragging, and aggravation of all the symptoms. This condition can fortunately be greatly relieved by the simple expedient of suspending the breast by means of a handkerchief slung round the neck.

It is a very usual thing for nurses to put the child frequently to the breast, with the view of relieving such symptoms as are here described. This, however, should always be done with caution, and in view of the whole circumstances of the case. For it must be remembered that this effect of the contact of the child is, not only to empty the breasts, but also to stimulate them to increased secretion, and, if this latter effect—as it well may be—is in excess of the former, the treatment is obviously injudicious, and is likely either to precipitate the direct effects of inflammation, or to induce an excessive secretion of milk, which in most women has a serious effect upon the general health. Besides, the too frequent contact of the child is apt to cause certain painful affections of the nipple to which we shall afterwards advert, and is by no means free from risk to the child itself.

Colostrum.—The colostrum, or milk first secreted, is somewhat irritant, and thus has a satisfactory effect in removing, by its laxative action, the meconium which occupies the bowels, and in preparing the mucous membrane of the alimentary canal for its functions of assimilation and excretion; but the too frequent ingestion of this, or even of perfectly developed milk, is apt to keep up a continuous digestive action in the stomach, and give that viscus no time to rest, and, even when the child sucks vigorously, the repeated over-distension of the stomach only results in rejection again and again of what has been swallowed. The mother ought, if possible, on each occasion, to put the child to both breasts, as the emptying of one, and leaving the other in a state of complete distension, as is sometimes done, is not likely to contribute much to her comfort. It is always better partly to empty both breasts than wholly to empty one.

It is, therefore, of great importance that the mother should be warned from the first not to put the child too frequently to the breast. If the child sleeps by her side, this is the ready method of cure for restlessness and screaming fits, and the child is often allowed to fall asleep with the nipple in its mouth; but, if it once contracts this habit, it may become impossible for it to be put to sleep in any other position, while

it drinks at intervals without the consciousness of the mother. This, of course, an experienced nurse will never permit, but it is a matter of greater difficulty to determine what is sufficient nourishment for an infant, and at what intervals it should be given. This would, perhaps, fall more properly to be considered in the following chapter, but, as it involves the interests of the mother as well as those of the child, we may here observe that it is of much importance to accustom the child from the first to drink at regular intervals. These, to begin with, may be every two hours, or, if the child be premature or feeble, and on that account able only to take a small quantity of nourishment at a time, it will be necessary to put it to the breast at shorter intervals. But the object of the mother should always be to increase the interval until, after the second or third week, the infant becomes accustomed to take its natural nourishment every three or even four hours. This enables the mother to have her natural rest, and allows of the steady and satisfactory filling of the breasts against the stated periods.

It often happens, in women too who have an abundant supply of milk, that much disappointment results from the frequent escape, and consequent waste, of the secretion. A certain amount of overflow, just at the commencement, when the breasts are tumid and distended, is so far beneficial; but, when this goes on—independent, it may be, of the amount of the secretion—it comes to be a serious matter, and may give rise to no little perplexity and annoyance. The milk which thus runs from the breasts may keep the woman in a constant state of moisture and discomfort, and, although it is possible to collect the fluid discharged in small vessels which are made for the purpose, and even to give it to the child by a spoon, this is always an unfortunate occurrence. It is certain that, by careful attention to the period at which the child should be put to the breast—on the one hand guarding against over-distension, and on the other avoiding frequent and irregular applications of the child—much may be done to prevent this loss. In some cases, when the glands reach a certain stage of distension, the woman is conscious of a feeling of momentary discomfort, and then of involuntary contraction, immediately after which the greater part of the accumulated secretion is expelled, not unfrequently in jets. In other instances, this spasmodic contraction is excited by the contact of the child, when both breasts are simultaneously the seat of contraction, so that while the infant is half choked with the milk of one breast, that of the other is expelled in jets as before. In another class of cases, the application of the child is attended with acute pain in the breast, of a neuralgic character, sometimes, indeed, so severe as to cause the woman to cease nursing. Emollient and sedative applications, such as bella-

donna, have been employed with the view of soothing this painful affection, but in some cases it defies both these and internal remedies, and ultimately compels the woman to yield.

Every conceivable shade of difference is found to exist between different women, even of the same constitution and temperament, in the quantity of the lacteal secretion, and also in regard to its quality. In one case, we find a delicate, fragile woman, who may even be the subject of constitutional disease, but is, nevertheless, over-burthened with milk, while, in the next which comes under our notice, a young, robust, and vigorous woman, who has never had an hour's illness, fails completely in so far as the lacteal function is concerned. We do not, of course, mean to imply that these are common cases, but they are certainly not such as would cause the experienced practitioner a moment's astonishment. The commencement of lactation may, in like manner, be ushered in with all the usual symptoms, and be at first abundant only to fail in a few days; while, in another, the secretion is ultimately satisfactorily established after a period of doubt and difficulty. Although, therefore, we know that strong and healthy women are more likely to prove good nurses, we can never be certain, until a week or even longer has passed, how the case, in this respect, is likely to turn out. There is no doubt that, although there are other conditions which influence the secretion of the milk, the state of the uterus, and the natural sequence of events of which it is the seat, exercise an important influence, owing to the well-known sympathy which subsists between the organs.

Agalactia.—In the condition which has been thus termed, the secretion is either altogether arrested, or is manifestly insufficient in quantity for the nourishment of the infant. Among the most frequent causes which lead to this condition are acute diseases, more especially if they immediately succeed the period of delivery. It is, in fact, one of the most common symptoms of those febrile diseases, which sometimes supervene on the puerperal state, to the alarm of the attendants, and not seldom with the most disastrous results; and the failure of the secretion is always looked upon as of more serious import, if it is accompanied by the premature cessation of the lochia. But, independent of any other marked or serious symptom, there is sometimes a simple failure of the discharge, where it is difficult or impossible to recognise the cause.

We are not, however, to suppose that such failure is conclusive evidence of permanent incapacity, on the part of the woman, to discharge this natural function. If due to a febrile condition of moderate duration, the discharge will often reappear with the abatement of the

pyrexial symptoms; so that, by feeding the infant artificially for a time, we may wait until we see whether or not the function will be re-established. This will be furthered by the application of warm fomentations to the breasts, and, of late years, the leaves of the castor-oil plant have been extensively used as a local application, with the view of increasing or exciting the secretion. For this purpose the leaves are to be infused in a small quantity of water, and are to be applied along with this water, in the form of a fomentation.

The quantity of the lacteal secretion is, under no circumstances, to be accepted as a criterion of its quality. The eye enables us, in some measure, to judge of the abundance of the corpuscular elements upon which the nutritive value of the secretion mainly depends. This may, however, be more accurately ascertained by means of a lactometer, or by the use of the microscope; but it is to be remembered that the richest milk is by no means that which is necessarily best suited for the child.

Galactorrhœa.—This, which implies a too abundant secretion of milk, has been described under two forms, involving very different conditions and management. In the one, the quantity alone is abnormal, the nutritive value of the secretion being unaffected, so that our object in treatment would naturally be to guard against such an unnecessary drain upon the mother as might be expected ultimately to compromise her general health. In this variety, the effect produced upon the child may be perfectly satisfactory, the only inconvenience, in many cases, being from the rapidity and abundance of the flow from the reservoirs within the gland, so that the mouth of the child fills much more rapidly than it can swallow, to its great and obvious discomfort. The treatment of such a case should consist mainly, if not entirely, in regulation of the diet, watching narrowly the while what effect is being produced upon the health of the mother, and adopting such means as may seem necessary for its rectification, by the partial arrestment of the discharge, or otherwise.

In the other variety of galactorrhœa, the conditions are widely different. Here, too, there is abnormal abundance; but, in addition, we find that the increase in bulk depends mainly or entirely upon an augmentation of the watery parts of the fluid. Not only is this a state of matters extremely unfavourable to the infant, but it is often observed to exercise an unsatisfactory influence upon the mother. Indeed, in extreme cases, so serious and so obvious are the effects thus produced, that the expression "Mammary Diabetes" has been suggested by the rapid emaciation which occasionally supervenes. Along with great feebleness, there unfortunately exists sometimes, in these cases, complete loss of appetite,

so that it is almost impossible to combat the symptoms by what we might judge to be appropriate diet. When the anorexia is less marked, the digestive functions may be disturbed—gastric and intestinal disorders being of frequent occurrence, taking the form, it may be, either of vomiting with heart-burn and pyrosis, or of obstinate diarrhœa with flatulent distension and tenesmus. In those cases, ordinary remedies may prove of little avail, and, after a few weeks of struggle, it will become evident that no alternative remains except to wean the child, and to take such other measures as may permanently arrest the secretion. This affection is believed to be particularly dangerous to those who have any phthisical tendency.

Management of Lactation.—From what has been said, it will be sufficiently obvious that the management of lactation must not unfrequently be a prominent part of the duties of the accoucheur. Nothing, in this respect, is more important than that the diet of a nursing woman should be, in quantity and in quality, such as is most likely to conduce to the health of the child, as well as to her own. In the case of a perfectly healthy woman, but little attention to regimen is required—nothing further being necessary, in such instances, than that the woman should avoid any imprudence in diet, while in other respects she need make no change in her ordinary habits. The pregnant state, however, and the subsequent exhaustion which attends the process of parturition, very generally leave the woman in a condition which manifestly requires generous treatment, in order that the health may be re-established, while provision is made for the special drain on the system which the function of lactation involves. Among the higher classes, where luxurious habits tend to the diminution of constitutional vigour, and among the inhabitants of towns, the necessity for such treatment is much more prominently marked than in country districts, where a life of physical exertion, spent, to a great extent, in the open air, implies hygienic conditions which are the very opposite of those which we observe in the other case. In ordinary practice, however, the necessity for a liberal dietary is so universally recognised that there is a danger of falling into a routine practice in this respect, the result of which will, undoubtedly, in some cases, be the reverse of beneficial.

As the result of some experience and close observation, we are convinced that indiscriminate over-feeding and stimulation of nursing women is a more frequent cause of the disorders of early infancy than is usually supposed. Nurses and mothers can readily understand how a thin and watery milk should fail to nourish the child, but it is by no means so easy to convince them that a specimen rich in nutritious elements may possibly be, from its very richness, the cause why an

infant does not thrive. We have again and again seen cases of obstinate diarrhœa, with or without vomiting and other symptoms of gastro-intestinal derangement, which could only be attributed to this cause. Drugs are of no avail: the appearance of the mother may be such as to prevent even a suspicion of any fault on her side, and yet strict inquiry as to what she eats and drinks often points clearly to the simple and only proper treatment. It is to the use of stimulants that the attention should in these cases be more particularly directed; for we often find that women are encouraged, without any reference whatever to their general health or the state of the milk, to take considerable quantities of ale or stout, or of the stronger wines. Diminishing the quantities of these stimulants, and in some cases absolutely forbidding their use, will certainly, in many instances, be followed by a marked and immediate amelioration in the symptoms. But, even when stimulants are not admitted into the dietary, the cause may still be discovered in the habitual use of food which is too stimulating in its character, or which is taken in too great quantity.

An interesting series of observations, bearing directly on this subject, have been deduced from analyses conducted by M. Péligot, with the view of ascertaining the nutritive value of the lacteal secretion at various epochs. From these analyses, it would appear that, the longer the milk remains in the breast, the thinner and more aqueous does it become. It has been clearly established, further, that the milk which first flows from a distended breast—this being the portion soonest secreted—is comparatively watery, and that the quality of the milk becomes richer as the gland is progressively emptied. Hence a very obvious indication of treatment. When, for example, the child seems to be suffering from too rich milk, and there is reason to suppose that it is put too frequently to the breast, before the gland has time to fill, it may suffice to extend the period between the repasts, which, by giving the gland time to fill, also ensures that the child obtains a less rich milk, and one more suited to its digestive capabilities. And we believe that the same facts may possibly be turned to account in the treatment of the opposite class of cases, where the secretion is too watery, and yet abundant, by partially emptying the breast before the child is put to it, so that, the more watery portion of the milk being removed, the child obtains the more nutritious residue.

The duration of lactation varies very considerably. It may cease quite unexpectedly, a few weeks, or even days, after the secretion has been established, or it may last for years. Between these two extremes the range is obviously great, but, as a rule, in cases in which the whole circumstances are perfectly normal, the average duration may be set

down as from twelve to fifteen months. This is, of course, supposing that the woman goes on nursing, and that nothing is done with the view of interrupting the function.

Influence of Menstruation.—The influence which is produced upon lactation by the menstrual function, is a subject in regard to which very vague ideas are sometimes entertained. As a rule, a woman does not menstruate while she continues to nurse, so that no disturbing influence from this source normally exists. In a very considerable number of instances, however, she menstruates after five or six months; and, in a small proportion of cases, the menstrual function is regularly discharged during the whole period that she gives suck. Much discussion has taken place as to the influence which the constitutional disturbance inseparable from the menstrual molimen exercises on the process of lactation, and the question is often put to the medical attendant, whether the appearance of the catamenia is a sufficient reason for ceasing to nurse. It is beyond doubt that, in a large number (probably the majority) of cases in which menstruation occurs during lactation, no perceptible effect is produced upon the child. It is equally true, however, that marked disturbance of the one function attends the premature establishment of the other, as is evidenced by the most delicate of all tests—disturbance of the functions of the child—which in some cases is very marked, and recurs at successive menstrual epochs. We must not, therefore, in replying to the question stated above, rashly assume, either that menstruation forbids nursing, or that it is to be disregarded. The truth lies between the two, and the solution of the question is to be found in a careful observation of the effects which are produced on the mother and child, upon which alone a definite opinion can be formed.

Pregnancy during Lactation.—It sometimes happens that a woman becomes pregnant while she is still nursing, although the rule is that, during lactation, the generative functions are in abeyance, in so far, at least, as ovulation is concerned. In the exceptional instances referred to, it is not too much to suppose that, the whole generative force being diverted into a new channel, the nursing power must necessarily diminish; and that this is actually the case, is the experience of all who have watched these phenomena most closely. During the first weeks of such a pregnancy, the lactation may be but little disturbed, although there is good reason to believe that a failure in the amount of the milk, or an alteration in its quality, precedes, not unfrequently, the period at which the woman becomes conscious of her state. On the whole, we do not hesitate to assert that the existence of pregnancy is a clear indication that the woman should cease to nurse.

In addition to the disorders of lactation already mentioned, the mother is liable to certain other disorders or disturbing influences, the management of which is included in the duties of the medical attendant. The most familiar of these is, undoubtedly, Inflammation of the Mamma. From whatever cause the inflammation may spring, the condition of the gland during the puerperal state manifestly is such as to favour the extension of inflammatory action which has arisen within the structure. Exposure to cold, the irritation of sore nipples, and constitutional disturbance of various kinds, are a few among many causes leading to local inflammation, which almost invariably attacks, in the first instance, the tubular structure of the gland.

Mammary Abscess.—But a mere local affection of an external organ of limited extent would probably be looked upon with little alarm, were it not for the fact that there here exists a peculiar liability to the formation of pus, resulting only too frequently in the formation of mammary abscess. It is said that women of a weakly, delicate, or scrofulous constitution are peculiarly liable to mammary abscess; but, whether this be the case or not, there are many cases in which, in women of perfect health and vigorous constitution, this troublesome affection quite unexpectedly manifests itself. There is, certainly, a great tendency to its reappearance in those who have suffered on a former occasion, but, beyond this, there is no marked predisposition upon which we can rely. The inflammation which precedes the formation of abscess is, if it be at all violent, ushered in by rigors, which are often of considerable severity. This is immediately followed by fever, and very shortly by lancinating pain in the breast, which is increased on pressure. The site of the pain, usually circumscribed, is further indicated by the presence of swelling and hardness, which, in favourable cases, become gradually resolved as the inflammation subsides, without the formation of pus.

But, when abscess forms, the progress of the case is widely different. The inflammatory action, commencing, as we have seen, in the glandular structure, extends to the cellular tissue. The tumour, hard before, becomes less circumscribed and softer, although no less painful The general symptoms are unabated; and, as the swelling still further increases, the cutaneous surface becomes hot and red, and ultimately œdematous, glazed, and shining. The latter symptoms indicate the formation of pus, the presence of which is still more clearly manifested by the feeling of fluctuation, which becomes more and more distinct as the cavity enlarges, and the pus approaches the surface. With the formation of matter, there may be a renewal of the rigors, and there is generally painful throbbing and exacerbation of the fever. Finally, the

cutaneous tissues yield, and the abscess bursts, discharging its contents, to the great relief of the patient. Unfortunately, however, her troubles do not always cease here; for, under the influence of a protracted drain on the system, she may be reduced to a condition of deplorable weakness, which may be aggravated by obstinate gastric or intestinal derangement, or by profuse night sweats. The cases which are, in the first instance, the most severe, are not necessarily those which ultimately produce the most serious effect upon the patient. It is true that the symptoms are, at first, in proportion to the violence of the inflammation and the extent of the abscess. But, on the other hand, the violence of the attack is often, under such circumstances, apparently expended, and, unless the discharge is abnormally protracted, the gland may gradually resume its healthy condition and normal function, while the constitutional symptoms rapidly disappear.

In another class of cases, the symptoms at the outset are comparatively moderate, and the abscess correspondingly small. When the latter discharges itself, or is relieved by operation, the cavity contracts, and we imagine that the case is at an end. But, ere long, the former symptoms reappear, a second abscess forms, runs its course, and discharges its contents as before; and, in some cases, a succession of such local inflammations, individually of limited extent, may produce, collectively, such effects as more seriously to influence the health than a case which may at first have excited more apprehension in our minds. In those cases of repeated small abscesses, there is often extensive induration, which may affect the whole, or the greater part of the gland, especially that part of it immediately surrounding the nipple.

The result of severe inflammation of the mamma, whether the abscess be single or multiple, usually is to destroy the nursing function of the gland. It is not that the secreting function of the gland is necessarily, or even generally, arrested, but rather that the application of the child is attended with such pain and irritation, that it is at once impossible and undesirable. If the pus has been allowed to make its way to the surface, it often happens that a certain amount of sloughing occurs in the tissues surrounding, and immediately subjacent to, the orifice. By the same process, the continuity of the galactophorous tubes is also occasionally destroyed, and, as a consequence, a lacteal fistula is established. The continued secretion of milk in the unaffected portions of the gland is sometimes a serious obstacle, in this and other ways, to the satisfactory issue of the case; so that it is proper, in many instances, by friction or the external application of belladonna, to do what we can to arrest permanently the function of the mamma on the affected side.

It sometimes happens that, by sympathy or otherwise, the other gland becomes similarly affected by inflammation and abscess, which, of course, makes the case a much more serious one.

The Treatment of inflammation of the mamma is thus, it need scarcely be observed, a matter of the highest importance. The initiatory phenomena of inflammation are to be combated by a careful management of the secretion, which should not be permitted to accumulate within the gland. This is, however, a matter of considerable difficulty, for, while the application of the child, or the breast-pump, is often productive of irritation, rubbing of the breasts, which is the other alternative, is apt to increase it also. Cold or evaporating lotions are not to be depended upon, so that we are often obliged at once to have recourse to leeches, fomentations, and poultices, just as we would in the case of the inflammation of any other gland.

Should all our endeavours fail—as, unfortunately, they often do—to arrest the inflammation, the earliest indications of the formation of pus are to be earnestly looked for. So soon as fluctuation can be detected, however faintly, the case may, we believe, often be cut short by early puncture, by means of an exploratory trocar or needle, which, by giving vent even to a few drops of pus, relieves tension, and often, apparently, arrests the course of the disease. Where fluctuation is already distinct, and near the surface, free incision should be practised in the most depending part, making the opening—in order to avoid the lacteal tubes—in a direction radiating from the nipple, while the usual antiseptic precautions are employed, as in other surgical affections of a similar character. In some instances where the abscess is large, a drainage tube may be usefully employed. Both before and after the operation, great comfort is afforded to the woman by suspending the breast, by means of a handkerchief tied round the neck. In the case of a large abscess, the contraction of the cavity may be promoted by the application, externally, of broad strips of sticking-plaster, so adjusted as to contract the cavity within which the matter lies. In other respects, the affection is to be treated as an ordinary surgical lesion, while the general health must, of course, be carefully attended to. Whenever much trouble is encountered in the treatment of mammary abscess, we should not delay in ordering the removal of the child from the breast.

Excoriation and Fissure of the Nipple.—These are affections so common, and withal so troublesome and painful, that their treatment should be a matter of interest to every careful and judicious practitioner. Although in themselves they are comparatively of little moment, they are of peculiar importance as causes of the more serious affections which we have just been considering. Much may, undoubtedly, be done in the

way of prevention. Women, among the higher classes especially, should be instructed to lave the nipple, for many weeks before delivery, with some mild astringent or stimulant lotion, such as a weak solution of tannin in rose water, or any dilute spirit. When, however, excoriation has already taken place, the nurse should be instructed to apply some very gentle astringent at first—nothing being better than a strong infusion of tea. Failing this, the applications above recommended for prevention may be tried, or other similar medicaments—of which there is an endless variety—may be adopted. Care, must, however, be taken to avoid such substances as may be prejudicial to the child—such as acetate of lead; and, in all cases, the application should be washed off very gently before the infant is put to the breast. In the more obstinate cases, the following will be found an admirable substitute.

℞

Acid. Tannici, ...	gr. iii.	
Glycerin., ...	ʒ ss.	
Unguent. Cetacei, ad . . .	℥ i.	M.

Fissures or chaps are even more troublesome than excoriation; for, although they may at first be but trifling, every application of the child tends to tear them open, and undo the healing process of the interval. The above, or any similar ointment, will here also be found of great use, the best method of application being to introduce it into the chap by means of scraped lint. Should the margin of the fissure become callous, it may be necessary to apply freely the solid nitrate of silver. The nipple-guard, or shield, is, in all cases, useful in protecting the affected parts from the pressure of the dress; and, when much pain is experienced in the act of suckling, the artificial nipple should be employed, which will protect the parts from the violence to which they are often subjected by the vigorous sucking of a healthy child. In some obstinate cases, the irritation is such that it may ultimately be found necessary to remove the child permanently from the breast, and to obtain the services of a hired nurse.

Use none of these astringents. These form scabs and the child next time [illegible] and [illegible] it and cause

CHAPTER XXXIX.

THE NEWLY-BORN CHILD.

Management of the Cord.—Clothing.—Cleanliness.—Light and Air.—Improper Use of Laxatives.—The Mother to Nurse if Possible.—Selection of Hired Nurses; their Diet and Regimen.—Causes of Difficulty in Sucking.—Congenital Malformations.—The Excretory Functions.—Diarrhœa: Simple or "Catarrhal," and Inflammatory or "Dysenteric" Varieties: Treatment of Each.—Constipation: Management of.—Icterus Neonatorum.—Thrush.—Artificial Feeding: Substitutes for Mother's Milk: Cow's Milk, Diluted and Sweetened: Nursing Bottles: Nurse to be procured if Child does not Thrive: Other Articles of Diet: Liebig's Food for Infants.—Weaning.—Dentition.

THE subject of this chapter has reference to certain points relative to the management of the infant after its birth, and the treatment of some of the more common ailments which are apt to attack it during the first weeks or months of its existence.

Management of Cord.—So soon as the nurse has, after the termination of labour, attended to those matters of detail which are essential to the safety and comfort of the mother, her attention is naturally turned to the child, which is then to be washed and dressed. The first point to be looked to after it has been thoroughly cleansed by soap and warm water, is the stump of the cord, which undergoes a process of putrefaction, and, ultimately, in the course of a few days, separates at the cutaneous margin of the umbilicus. The decomposition of the tissues of the cord takes the form rather of withering than of moist putrefaction; but, before it drops off, there is generally more or less of the odour characteristic of the process which is going on. To obviate this, it has long been the practice to wrap the cord in cotton or linen, passing the stump, in the first instance, through a hole which has been *burnt* in the cloth, so as to secure the antiseptic action of the charred margin. This, of course,

is not essential, but is, undoubtedly, favourable to cleanliness, and the dressing may be renewed at proper intervals, to be determined by the amount of moisture which makes its appearance, and which will depend, in a great measure, on the thickness of the cord. It occasionally happens, after the stump has dropped off, that the navel remains in a fungating condition. In other cases, ulceration, and even sloughing of the margin is observed, a condition which is always serious and sometimes fatal. For some time after the separation is complete, there remains a tendency, more or less marked, to the formation of umbilical hernia. This is particularly noticeable in the case of children who are subject to screaming fits, and to the straining which accompanies them, and it is in all cases to be guarded against by the application over the umbilicus of a soft pad, formed by several folds of linen, which is retained in position by the broad bandage of flannel with which the abdomen of the child is swathed. By increase in the thickness or otherwise, the pad may be so modified, in cases in which protrusion is threatened, as to retain the bowel within the abdominal cavity.

Clothing.—The clothing of the child is to be regulated with reference to season and climate. In all cases, however, it is to be remembered that birth almost necessarily involves a sudden and considerable diminution of temperature. Any failure, therefore, in the vigour of the circulation, such as may be anticipated in premature delivery, is very likely to be attended with a corresponding diminution in the temperature of the body, which not unfrequently involves great and sudden risk to the life of the child. The maintenance, therefore, at first, of an equable temperature is of the highest importance, and is universally recognised. On these grounds, flannel—which, as a bad conductor of heat, tends materially to sustain a steady temperature—is, to a great extent, employed in the clothing of infants. It has also the advantage of absorbing the discharges to some extent, and thus preventing any irritation which may arise from their prolonged contact with the cutaneous surface. While the infant is thus wrapped in its swaddling clothes, care should be taken so to arrange them as to admit of free movement of the limbs from the first. It was at one time supposed that the head of the child should be protected as carefully as its trunk; but the general practice now is rather to keep the head cool, so that, in this country, at least, it is the exception rather than the rule, to put even a light cap on the head of a child. Important as the maintenance of an equable temperature is in all cases, it is much more so when the infant is brought prematurely into the world—when it is necessary, in order to maintain the circulation, to swathe the limbs in cotton wool, at least during the first few weeks after birth. In all cases, for the first few months, the

heat of the trunk and lower limbs is further ensured by the use of long clothes.

Cleanliness.—Strict cleanliness is essential to the well-being of the infant; and in nothing is the difference between a good and careless nurse more clearly evidenced, than by the management of the napkins, and the protection of the parts from the contact of urinary and fæcal discharges. Neglect here frequently gives rise to troublesome excoriation of the nates, or in the flexure of the groins, and nothing, perhaps, is of more importance than that the child should be kept dry as well as clean. The use of the warm bath is universal, but, as regards the frequency with which it is to be employed, some degree of discretion may be exercised in individual cases. Many nurses, after the first few days, undress and bathe the infant, if perfectly healthy, night and morning, and apparently with benefit as well as with safety. Caution should, however, in this respect, always be enjoined, as, in some instances, too frequent bathing seems to produce an exhausting effect; and, in the case of feeble or sick children, it may only be possible to ensure cleanliness by rapid sponging, while the bath is either avoided altogether, or repeated only at intervals of two or three days. During the first six weeks, the child should not be permitted to remain in the bath for more than two or three minutes.

Light and Air.—These are as essential to the growth of a child as to that of a plant. At first, however, caution is, even in these respects, necessary. A dim and subdued light is thus more suitable, until the organs of vision become, in some degree, accustomed to the new stimulus; and, in like manner, until the new function of respiration, and the maintenance of temperature, are efficiently and vigorously discharged, we must take care, in our anxiety for pure air, not to expose the infant to vicissitudes of temperature. In the warm weather of summer, it may be taken out somewhat earlier, although, as a rule, it is better not to carry the child out of doors before the end of the second week; but, when this stage has been reached, nothing, perhaps, is of greater importance, or has a greater effect on the health and development of the infant, than its daily exposure in the open air, clothed according to the requirements of the season.

During the weeks which immediately succeed its birth, the infant passes the greater portion of its time, by day as well as by night, in sleep, but in this respect there is great variety, even with healthy children. For example, it often happens that they sleep quietly and almost continuously during the day, awakening only at intervals to go to the breast, while at night they are wakeful and restless. This, after a time, is often rectified by the management of an intelligent nurse

who, by keeping the child awake during a part of the day, or it may be, by bathing it at night instead of the morning, succeeds in breaking the habit, to the great relief and comfort of the mother, who otherwise has her rest broken and her nursing powers impaired. Sleep is certainly encouraged, and often very markedly so, by the daily exposure to the open air.

Improper Use of Laxatives.—The child should, for various reasons—some of which have been previously mentioned—be put early to the breast. The laxative action of the *Colostrum* generally produces the discharge from the bowels of the dark-coloured meconium which is lodged there. It is too much the habit of nurses to dose the infant with castor oil, under the idea that it is necessary in order to set up the excretory function of the bowels. This practice is no less deleterious in its results than it is irrational in theory, and, in point of fact, there is no more fruitful cause of subsequent gastric irritation and intestinal derangement. The accoucheur should therefore put his absolute veto on any such treatment without his sanction, at least during the period while he remains in attendance. It is no doubt more frequently required when the child is being nourished with substitutes for breast-milk, but in the great majority of cases, it is, to say the least, perfectly unnecessary. Another very general practice, is, during the first two days, before the secretion of milk has been thoroughly established, to feed the child with sugar and water. The effect of this, too, is often the reverse of beneficial, as this syrup is not only unsuitable to the nourishment of a newly-born child, but it is also apt to derange the functions and to give rise to ulterior ailments which may be the cause both of trouble and anxiety. A mixture of cow's milk and water, with a very small proportion of sugar—or, better still, of sugar of milk—is a more eligible substitute; but so soon as the milk becomes abundant, all such methods should be abandoned for the natural secretion of the mother's breast.

Mother to Nurse if possible.—Every mother should be encouraged to nurse her own offspring, unless under certain exceptional conditions which have been referred to in the preceding chapter. For not only is this to her advantage ultimately, by preventing too frequent pregnancies, but it is to the advantage of the child, by furnishing it with what nature has specially provided for its support. What has already been said with reference to the function of lactation, is sufficient to show clearly how important is the management of that function, in its bearing upon the child, no less than upon the mother. Care should be taken from the beginning to put the child to the breast at something like fixed intervals, gradually extending the periods from two to four hours as has been already explained. This, by allowing the breast to fill, and

permitting the mother satisfactory and continuous sleep, goes some way to maintain the quality of the milk, while, as regards the child, it gives the digestive and assimilative functions time to rest. There is certainly no more fertile cause of the minor digestive derangements, than the habits which prevail among the ignorant, of constantly putting the infant to the breast, as the ready method of cure for restlessness or screaming fits.

Hired Nurses.—Various circumstances—sometimes occurring quite unexpectedly—may render it impossible that the mother can nurse her infant. When this is the case, the medical attendant should always recommend that the services of a hired nurse be at once obtained, and, if this recommendation be acted upon, the duty of selecting a nurse devolves naturally upon him. This is a matter of no small importance. From what has been said in the preceding chapter as to the nutritive value of the milk in different cases, it will be obvious that some caution must be exercised, and especially that we should not too hurriedly infer, either from the abundance or the apparent richness of the milk, that the woman is to be looked upon with confidence as necessarily a good nurse. There are certain other matters in regard to which it is our duty to inquire. We thus look narrowly, and as a matter of course, to the general health, circumstances, and age of the applicant, a perfectly healthy young woman, from a country district, and between the ages of eighteen and twenty-eight, being generally preferred. With reference to general health, some have attached considerable importance to the state of the teeth, as affording a reliable indication, and, although this has certainly been exaggerated, there can be no doubt that the early loss of the teeth, and especially of the front teeth, by decay, is so far an unfavourable symptom. It is obviously our duty to determine, in so far as this may be possible, whether she is the subject of any disease which may be transmissible to the child. Any evidence, should it but amount to a suspicion, of serious organic disease, and especially of a phthisical tendency, may be held to warrant rejection. Unfortunately, the circumstances are such, in many cases, as to admit of at least the possibility of a syphilitic taint, and this is, therefore, a point in regard to which we should very specially be on our guard. To glance at the throat, the skin, the glands of the neck, and the hair, are, on this account, matters almost of routine in such investigations. We should also examine the breasts, not only with regard to their secretion, but as to the state of the nipple, while the presence of severe excoriations, and still more of fissures at the base of the nipple, are to be held as unfavourable conditions: and this for various reasons, one of the most important of which is the fact, that we can have no confidence

that she will prove a zealous and attentive nurse, if every application of the infant to the breast is attended with discomfort or suffering. If we have a choice in the matter, we should also select a nurse whose condition, as regards the age of the milk, is as nearly as possible that of the mother; and, if this cannot be attained, it is better that she should have been confined a little later than before her. It is always a matter of importance to be able to see the child of the nurse, as its condition may often be held to indicate the nutritive value of the milk. There are, of course, other matters, which have reference to the character and disposition of the woman, or to the fact of her having had previous experience in the rearing of children, which may be held as being of no small importance; but these are, perhaps, questions which do not so immediately come under the cognizance of the medical attendant.

The diet and regimen of hired nurses is a matter to which some prominence should be given. It is, indeed, of greater importance in this case than in that of the mother, that no overfeeding or other similar imprudence should be permitted. The simple rule in all such cases should be that the woman is supplied with plain and easily digested food, which, in point of quantity, should be ample, but at the same time, not more than is requisite for the maintenance of perfect health. If, with the view of contributing to the health and vigour of the child, the nurse is plied, as is often the case, with strong soups and stimulating articles of diet, at short intervals during the day, the result is likely to be exactly the reverse of what is anticipated, and the child suffers from over-richness of the milk, while the nurse becomes rapidly fattened. No rule can be laid down, however, as to the diet suitable for nurses, beyond this—that a large proportion of their food should consist in the simple and possibly frugal fare to which they have been accustomed. In this way the danger to which we have referred may always be avoided, but everything will of course, depend upon the habits of the country or district from which the nurse has been procured. In the rural districts of Scotland, for example, oatmeal, in the form of porridge, and generally eaten with buttermilk, is one of the most important items of daily food, and is well known to be admirably adapted for women who are nursing, although it was some years ago stated in a report presented to Parliament on the dietary of the English prisons that the food referred to was "similar to what is used in England for the fattening of pigs." The habits of the English peasantry and of the lower classes in all large towns will require to be taken into consideration in the regulation of the diet. In Scotland, beer and other malt liquors are seldom used, and are, therefore, quite

unnecessary; indeed it may be said that if a woman cannot nurse without stimulants, her assistance may be dispensed with. But, in England, where the daily use of beer is all but universal, this, to which the woman has become accustomed, should always be given, as probably essential to the maintenance of her physical condition.

Difficulty in Sucking.—The infant, if healthy, instinctively seizes the nipple from the first and sucks vigorously, and indeed has often been seen to suck the finger of the accoucheur before the trunk was born. It is not, however, always so. The difficulty arises, in many cases, from a peculiarity in the conformation of the nipple, which may either be unusually small, or—what is more common—has been carelessly allowed to be pressed in by the dress during pregnancy. This may generally be got over by having the nipple drawn out by the nurse or by a strong child, by the breast-pump, or by a soda-water bottle used like a cupping-glass, care being taken not to permit the parts to relapse into their former condition. With care and proper management on the part of the nurse, this difficulty is seldom a serious one. The child may, in other cases, especially when born prematurely, be unable by weakness to take the breast, a condition which is highly unsatisfactory. The woman, in these cases, should milk her breast into the mouth of the child, when it will generally swallow the milk as it flows; or she may drain it off by the pump, and feed the infant by a spoon; but the objection to this is that it is a bad plan to use a spoon if it can be avoided, for the child thus becomes accustomed to the spoon, and still further loses the instinct for the nipple. An idea extensively prevails among the lower classes that when a child has difficulty in sucking, or refuses the breast, it is "tongue-tied," but this is an obvious error. It, no doubt, does happen, although very rarely, that the frænum of the tongue is too short, or attached too far forward, but in ordinary practice it will probably not occur oftener than once in a life-time that the accoucheur is obliged to divide the frænum for this variety of congenital malformation.

Malformations.—It is the duty of the accoucheur to examine the child after its birth, and to inquire on his subsequent visits as to the various functions, in order that congenital malformations may not be overlooked. It may thus become evident, either immediately or shortly after birth, that the child is affected with some peculiarity which must be remedied in order to save its life. Such malformations as harelip, fall into the domain of surgery, but in the case of an imperforate condition of the anus or urethra, the general practitioner must be prepared to act promptly. In the former, an operation is necessary by incision in the direction of the rectum, or it may even be

necessary in extreme cases to form an artificial anus. Imperforate urethra, again, is rare, probably for the reason which is pointed out by Burns, that "generally the canal opens, in supposed cases of imperforation, about midway between the scrotum and glans penis;" and the result of experience seems to be that perforation of the glans seldom succeeds, so that it would probably be better to cut down upon the urethra than attempt to find its extremity. It may be necessary, even where there is no closure, to pass a probe or a very small elastic catheter into the bladder, in consequence of retention.

Excretory Functions.—We are often told, a considerable time after delivery, that the child has not made water. On such information, however, we must never act, unless there is some evidence of distension of the bladder. The urine is often voided in the bath, and thus escapes the notice of the nurse; and, if retained for a longer period than usual, the application of cold water over the hypogaster, or a teaspoonful of cold water given by the mouth, will generally have the effect of causing contraction of the viscus. Nor is tardy action of the bowels to be held as necessarily indicating the administration of laxatives, for, in this, as in the other case, nature generally will, if left to herself, bring the function into perfect order without any extraneous assistance. We must, in like manner, be cautious in the administration of such drugs as are usually employed in the treatment of diarrhœa. Be it remembered, in the first place, that there is, in healthy children, the greatest possible difference in the manner in which the bowels discharge their functions. In one the frequency and the character of the evacuations may seem to amount to diarrhœa, and in another the dejections are habitu[illegible] costive; but, so long as the infant remains in perfect health, dr[illegible] all kinds are to be scrupulously withheld. In many cases [illegible] succeed in producing the effect which we desire by adm[illegible] given drug to the mother and thus influencing the com[illegible] milk, but we can scarcely be too cautious in any atte[illegible] upon the child.

Diarrhœa, although of more frequent occu[illegible] of dentition, may happen at any period sub[illegible] child. A strict attention to the directio[illegible] will suffice, as we have reason to beli[illegible] special conditions which are apt [illegible] but, even under circumstances [illegible] infants is only too familiar [illegible] "simple" or "catarrhal" [illegible] most frequent, is also the least s[illegible] ewly-born child, the enormous quantity [illegible] d out may

reduce the strength of a puny infant so rapidly, as to place it in a most critical condition in the course of a few hours, without any evidence whatever of inflammatory action. If the action of the bowels is accompanied by obstinate vomiting, the case may be looked upon as much more alarming in its nature; but simple, uncomplicated diarrhœa is seldom dangerous, unless it passes into the more serious variety. The appearance of the discharge, as seen on the napkins, varies greatly, from a watery and almost colourless fluid, to a slimy matter, which may be frothy or bright yellow like the yolk of an egg, and, in other cases, green, mixed with fragments of curdled milk, and possibly streaked with blood. A much more alarming variety is where the diarrhœa takes the "inflammatory" or "dysenteric" form, when it is generally attended with corresponding gastric disturbance, and with a marked increase in the temperature and in the frequency of the pulse. Between the extremes, the varieties in individual cases are endless, and, consequently, the treatment which may be held as applicable in each must vary in a corresponding degree.

Unless on an emergency arising from the violence of the symptoms, we should always, in very young children, try the milder measures first. A teaspoonful of lime water given with a little boiled cow's milk, or with the milk of the mother, has often a marked and immediate effect. The number of cases which may be traced to imprudence in the dietary of the mother or the nurse is, we believe, much greater than is generally supposed, and we would, therefore, recommend that this should always be inquired into, and, if necessary, modified without delay. Should the presence of blood in the stools, an appearance of tenesmus, and general inflammatory symptoms, indicate the existence of the more serious form, nothing has a better effect, if it can be retained, than castor oil with [illegible] drop of laudanum. Among other available astringents [illegible] catechu or kino, which may be administered in the [illegible] mixture, to which may be added, in the event of [illegible] symptom, a proper proportion of pepper-[illegible] water. The young practitioner cannot be too [illegible] opium in any of its forms, for, although he may [illegible] the discharge, the benefit which results is of [illegible] and, indeed, the symptoms would some[illegible] on after opium worse than before. The bright green [illegible] of the evacuations, to which reference has already been made, [illegible] not to be looked upon as necessarily a very unfavourable condition, and [illegible] in mentioning the fact at this place is that this condition [illegible] somewhat too frequently, to be admitted as a reason for the a[illegible] of powerful drugs. When, at a somewhat

more advanced age, the child is being fed, an alteration in its diet and a recurrence to the simpler nourishment of the early months will often suffice to arrest the symptoms.

In the case of habitual *Constipation*, an old and favourite remedy is manna given with milk. Nothing is easier, of course, than to move the bowels, either by this, by castor oil, or by any other laxative; but it will generally be found that if we begin with laxatives, they must be continued. On this account, many nurses prefer to use an injection of soap, or to pass into the rectum a small piece of soap, which is cut so as to admit of its easy introduction. We cannot doubt, however, that a large proportion of such cases are unnecessarily treated, and would do quite well if left alone.

It is only possible for us very briefly to notice a few of the more common ailments which affect the infant shortly after its birth. The vulgar nomenclature of these disorders has unfortunately shrouded the subject with an obscurity, which the limited knowledge of most midwives rather tends to deepen. Such terms as "hives" and "gum" are familiar in the mouths of experienced matrons of the lower class; but, unfortunately, indicate nothing—or, rather, so many different things, that the words have lost any scientific signification which they may have had. One of the most common of the affections alluded to is what is known as *Icterus Neonatorum*. It was at one time generally supposed that this very common affection indicated some serious pathological condition, the liver as well as its function being believed to be implicated. The chief symptom of this familiar affection is a tingeing, more or less marked, of the skin, which becomes of a yellow colour. In immature or feeble children, this gradually deepens, and distinctly affects the conjunctiva, while the colourless condition of the evacuations points still more clearly to the analogy which subsists between this and ordinary jaundice. Although it may be too much to suppose, as some have done, that this is a "perfectly natural state, in which the skin and other secreting organs are called on for a few days to assist in disposing of the bile, until the demand for it to minister to the digestive function becomes equal to its abundant supply," we may, in the case of a child otherwise healthy, look upon the phenomenon in question without the slightest apprehension. If excessive, it is usual to give a grain of Hydrarg. c. Cretâ, followed by a small dose of castor oil; but even this is rarely necessary, as the discoloration generally passes off spontaneously, and almost as rapidly as it came on.

We may here briefly advert to one other of the affections of infancy, which is generally, although not invariably, associated with impaired nutrition. This is familiarly known under the name of *Thrush*. If we

look into the mouths of children who are the subjects of this affection, we observe on the surface of the mucous membrane of the tongue, lips, and cheeks, a number of small, circular, white spots, which appear at the first glance as if minute portions of curdled milk had adhered to the surfaces in question. A more careful examination shows either that they cannot be detached, or, if so, that the subjacent surface presents an eroded appearance. Microscopic researches, as to the nature of this affection, have proved that it is due to the presence of a cryptogamic vegetation, which is, more or less obviously, associated with derangement of the digestive functions. It has been conclusively demonstrated that this may be transplanted from one mucous surface to another; and we have seen more than one case in which a troublesome affection of the nipples, and of the contiguous cutaneous surface, had apparently been directly produced by it. The treatment will consist in such measures as may remedy the digestive ailment upon which it is presumed to depend; and, at the same time, the local affection is to be treated by the application of a solution of twenty grains of borax in an ounce of water, which may be replaced, in the more obdurate cases, by a solution of chlorate of potash, or even by a solution of nitrate of silver, of four grains to the ounce of distilled water.

Substitutes for Mother's Milk.—In cases in which the parents are not in circumstances to afford the services of a wet nurse, and in other instances in which there is an unconquerable repugnance to the employment of a hired nurse, it may be necessary, from the first, to rear the child by the use of certain substitutes for breast milk—its natural food. Our primary object must, therefore, be to provide such nourishment for the infant as may, chemically and otherwise, most nearly resemble that which nature provides. Asses' or goats' milk probably approach in their composition nearest to the secretion of the mammary gland in the human female, and, if obtainable, may on that account be preferred. The objection to the milk of the cow is, that it is so much richer in the corpuscular element that, if given undiluted to a young infant, it rarely fails to engender some form of gastro-intestinal disorder. This is, however, in the vast majority of cases, the best substitute which is within reach; and, as the fundamental objection to its employment is its richness, experience has shown that simple dilution with water furnishes a material by which hundreds of thousands of infants are, without difficulty, reared. Still, even under circumstances the most favourable, it is obvious that the best substitutes for breast milk are open to objection, and we are, therefore, not astonished to find that infants, thus artificially reared, are more liable to disease, and more likely to succumb to it. On this account alone, were there no other

argument in favour of it, it is the duty of the accoucheur to insist, as far as he can, upon all children being reared at the breast; and, in the case of children born prematurely, he should absolutely refuse his sanction to any proposal otherwise to nourish them.

The amount of water to be added to cows' milk will, of course, depend upon its quality. If rich and pure, an equal bulk, or even more, of water may be added, but it is, in towns at least, rarely necessary to add more than a third of water, in order to reduce an average specimen to the extent which is requisite. Such a mixture as this is, as compared with human milk, deficient in the saccharine element, and it is on that account usual to sweeten it with the ordinary sugar of commerce; but what should always be preferred, when it is within reach, is the sugar of milk, which is now prepared in considerable quantities for this purpose from the whey of cows' milk. The mixture should always be given warm, about blood heat, to which temperature, therefore, it must be artificially raised. A great variety of nursing bottles have been devised, most of them being simple as well as ingenious in construction, with the object of enabling the child to suck from an artificial nipple at the extremity of the apparatus. In a word, our whole object is—when a child has to be reared artificially—to assimilate all the conditions as nearly as possible to those which exist when the natural source is available. The success of bottle feeding depends very greatly upon the care and experience of the mother or nurse, and upon nothing does the ultimate result hinge more than upon strict attention to cleanliness. It is well known that it is more difficult thus to rear a child in summer than in winter, from the rapidity with which, in the former case, the temperature acts upon the milk. It is also well known that, when the apparatus is not kept scrupulously clean, small particles of curd are apt to accumulate within it or the tube, and these again, if swallowed by the infant, are more than likely to excite gastric or intestinal disturbance: but these difficulties are, fortunately, in a large majority of cases, completely overcome, and the infants, if originally vigorous and mature, are often pictures of health.

So long as, under such alimentation, the functions of digestion and assimilation are perfectly discharged, we may well be content with the condition of the child; but when—as occurs in a certain proportion of cases—the child pines and is not *thriving*, the digestion is impaired, or obstinate diarrhœa supervenes, we must, without delay, adopt means for its relief. It is usual, when at all practicable, to obtain the milk for an infant from one cow, and what, in the condition alluded to, has often been found sufficient is simply to change the cow, as, under other circumstances, we might do with the nurse. But, when this and other

simple remedial measures fail in producing an effect, and the infant continues to droop, we should lose no time in urging that a nurse be obtained at once. In many cases this is delayed until the condition of the child becomes critical, and the assistance of the nurse, when eventually obtained, is too late to rally the little sufferer from the condition into which it has fallen; and, in fact, this question often devolves a serious responsibility upon the medical attendant, who is certainly blameworthy if he fail to interpose his authority before it is too late.

The period at which other articles of food are to be permitted to the child, is another question, in regard to which we are often expected to express an opinion. Much will no doubt depend upon the health of the mother, and the abundance or otherwise of the lacteal secretion, but we have great reason to believe that the tendency is considerably to anticipate the period at which a variety of diet may safely be permitted. We think we are justified in concluding that, for the first three months, milk and milk alone is the best as well as the most natural food for the child; but, in this, as in most other respects, the safest and most reliable indication is to be found in the condition of the child itself. So long, indeed, as its appearance and development, the manner in which its functions are discharged, and the extent to which it enjoys refreshing and quiet sleep, indicate perfect health, too much caution cannot be exercised in sanctioning any change, unless indeed the interests of the mother should render it imperative.

Of the many substances which have been employed as substitutes for, or supplementary to, milk in the alimentation of infants, nothing has, perhaps, of late years attracted more attention than the Food for Infants which was devised as the result of much original research by Baron Liebig.[1] Boiled bread and milk, arrow-root, corn flour, and a host of

[1] This may be obtained in any quantity, carefully prepared by eminent chemists, but as its price puts it beyond the reach of the humbler classes, we are induced to borrow some sentences from a little pamphlet published on this subject by a lady, whose main object was to bring the food within the reach of all. "The ingredients required," she writes, "are the following:—

Malt,	½ oz.
Second Flour,	½ oz.
Skimmed Milk,	6 oz.
Water,	1 oz.
Bicarbonate of Potash,	7¼ grains.

"I may mention here that, after picking out other seeds which are often found among malt, and which may be injurious, the malt should be crushed in a mortar or ground in a coffee mill. Mix all the ingredients together, and put them in a pan thoroughly clean, boil for six or eight minutes, stirring all the time; remove from the fire, strain through an ordinary sieve or piece of muslin, and give to the

simple and easily digested substances are extensively employed, the article selected depending more upon the fancy or prejudice of the nurse than on any marked superiority of one over another. Nothing, we are assured, is better than rusks, if they can be obtained of good quality; and if well made they require no boiling, but are to be covered for a minute or two with boiling water, which is then poured off, and milk or cream, with a very little sugar, added before it is broken up. When the child grows older, a little carefully made chicken soup or beef tea may be given twice a week; and, by thus adopting each change of diet with caution, it may be gradually altered so as to suit the increasing requirements of a higher stage of development.

Weaning.—The separation of the child from the mother involves something of a crisis in its existence, and is generally, as might be expected, attended with more or less constitutional disturbance. The condition of the mother must necessarily, as has already been shown, point clearly in many cases to the conclusion that the infant should, in her interest, be at once withdrawn. But, when circumstances are in all respects favourable, it has in every instance to be determined what is the proper period for weaning—what time, in the interests of both, is to be selected for the severance of that physiological tie which binds together the mother and her offspring. It is very unusual to wait until the occurrence of pregnancy, or the condition otherwise of the mother, shows clearly that she is no longer able to supply proper nutriment to the child. Were we even to look at the case without any reference whatever to the maintenance of her health, a very little reflection should suffice to show that nursing beyond a certain average period is little likely to maintain the health, or well-being of the infant; but as, in this matter, the interests of the mother are in a sense inseparable from those of the child, it is sometimes a question involving both care and discrimination absolutely to fix the time for weaning.

child through a feeding bottle. See that the holes in the nipple of the tube are large enough to admit of the food passing through them, and that it be not given too warm. The above quantity daily will be found sufficient for an infant for the first few days; but very soon it will have to be increased to two or three cupfuls, and more. For a new-born child who has to be fed entirely on this food, it should be made at first half milk and half water. Use *skimmed* milk; new milk is too strong. If properly made, the food should be quite sweet, and taste as though sugar had been put into it; but sugar must on no account be used. The quantity required for twenty-four hours may be made at once, and heated for use as required. Malt can be had at the bakers', who use it for making bread. It is dry and slightly crushed, and should be ground fine before using; this can be done in an ordinary coffee mill."

It has frequently been asserted that the natural period for separating the child from the mother is on the completion of the process of dentition; and it may, perhaps, be admitted that, theoretically, the idea is not destitute of validity. Every one knows, however, that, although it may be possible to nurse for two years—the period at which the first dentition is usually completed—the amount of milk secreted ceases long before that to be sufficient for the nourishment of the child. Indeed, the cases are exceptional in which a woman is able to suckle her child, without assistance in the way of extra aliment, for a longer period than ten months, and a large proportion of mothers and nurses require supplementary aid much sooner than this. In cases, therefore, of protracted lactation, the breast milk is generally an insignificant portion of the total nourishment which is given to the child, and we can scarcely doubt that, under such circumstances, weaning might have long before been effected, in the interest of the infant, as well as in that of the mother. For while, on the one hand, a deteriorated lacteal secretion can scarcely fail to exercise a pernicious influence on the child, so, on the other hand, a long-continued drain on the system is seldom without its effect on the health of the nurse.

With a healthy and vigorous nurse, it is better that the child should have nothing but what she can afford it for the first six or seven months; and, certainly, the practice of feeding the infant during the night, so as to avoid trouble and disturbance to the mother, which has become too common of late, is one to which—save under exceptional circumstances—we should give no countenance. A partial failure in the quantity or quality of the milk, may, no doubt, occur at a period very much earlier than that to which we refer, so that it may be absolutely necessary, even at the second or third month, partially to feed, while nursing is simultaneously going on. It is, in all cases, advisable to accustom the infant to other food before the breast milk is withdrawn; otherwise, the process of weaning is much more troublesome, and is more likely to be productive of unsatisfactory results. When this is done, and when the proper time arrives, the quantity of milk should be gradually and steadily diminished, and the proportion of other nutriment correspondingly increased, until the latter alone remains. Seldom, however, is this effectual without more or less of trouble, arising from the restlessness which the deprivation of the milk excites in the child, but, if the weaning process has not been too abrupt, the screaming fits and other evidence of discomfort will not last beyond a couple of days. And, as regards the mother, any discomfort which she may experience may be easily kept within moderate bounds by saline laxatives, abstinence from fluids, and the

application of belladonna or cooling lotions to the breast, until the gland ceases to discharge its function.

The general health of the child is the point which, above all others, is of importance, in its bearing on the period to be selected for weaning. It is proper, therefore, to await the subsidence of any febrile attack or even of an ordinary catarrh, or any other trifling ailment, before weaning the child; and it is, we may say, the universal practice to regulate the process, in some measure, by the progress of dentition, which is, as we shall see presently, almost invariably marked by stages, these being separated by intervals during which such constitutional disturbance as may attend the eruption of the teeth completely disappears. It is well, therefore, to select the latter periods as those at which constitutional irritation is less likely to be engendered. There is, as we may well suppose, the greatest difference in the ease with which children are weaned—the deprivation causing, in one case, scarcely a gesture indicating uneasiness or discomfort, and, in another, a degree of fretfulness, and even of constitutional disturbance, which seems quite out of proportion to the cause. This depends, no doubt, upon the temperament, or possibly, upon constitutional causes; but there is every reason to believe that the idea, which has so long obtained, in regard to the bearing which the progress of dentition should have on the question of weaning, is well founded, and ought, in all cases, to be admitted, as affording indications of no small importance. But to attempt to fix absolutely the period of weaning, as applicable to all cases, is as absurd in theory as it would be found to be unsatisfactory in practice, were it for no other reason than the well known irregularity which attends dentition. In the case of a perfectly healthy infant, and an average result in the eruption of the teeth, we may, however, assume that ten months is a proper period for weaning, as at this time there is usually a pause in the process of dentition, subsequent to the appearance of the eight incisors.

Dentition.—Among the many reasons which indicate the necessity for a careful alimentation of the child during the early months of its existence, there is perhaps none of greater importance than that the system may be prepared for the contingencies which so often attend the appearance of the teeth. From imperceptible constitutional disturbance, to convulsions and derangement of all the functions at the cutting of every tooth—which may be held as indicating the extremes—cases offer themselves presenting every conceivable variety of symptom intermediate between the two. There are few more perfect illustrations of the delicate sympathy which exists between functional disturbance and distal irritation, than are afforded by watching the progress of the

first dentition. As a rule, indeed, the symptoms are merely those of local irritation; but, in a large proportion of all cases, the sympathy referred to is evidenced by more or less of gastro-intestinal derangement, while, in a considerable number of instances, a reflex irritation is manifested in symptoms which indicate, more or less clearly, a disturbance of the nervous centres.

Although, as a general rule, the development of the milk teeth within the jaw involves neither local nor constitutional disturbance, and it is only as they are about to penetrate the gum that the symptoms to which we have alluded first manifest themselves, the influence of the process is sometimes exhibited a considerable time before the teeth upon which the phenomena depend make their appearance. So long as no tumefaction, or other morbid condition of the gum, is observable, our treatment can only be expectant, or, at least, directed to the functions which are disturbed; but this is clearly one of the conditions to which we have already referred as indicating the necessity for caution in the matter of weaning—for there can be little doubt that, in such cases, a change, and especially a sudden change, in the nature of the food is very likely to be followed by an aggravation in the general symptoms. Such a state of matters is, in fact, sufficient warrant for protracting the period of nursing until more favourable conditions manifest themselves, which will generally be the case on the eruption of the first teeth.

Although the process is subject to many irregularities, the teeth generally make their appearance in a certain order, as is represented in the following formula, where the figures indicate the month at which, in mature and healthy children, we may expect the various teeth, the dentition usually commencing with the incisors of the lower jaw:—

Molars.	Canine.	Incisors.	Canine.	Molars.
25—12	18	9—7—7—9	18	12—24

From this it appears that the milk teeth—which are twenty in number—come through the gums in the following order. It is, of course, understood that an infant may be born with teeth, or may not have a tooth until several months later than is indicated by the formula, and in either case without a single special symptom. On an average, then, the central incisors make their appearance in the course of the seventh month, and are followed, about the ninth, by the lateral incisors. After this, which is the time generally selected for weaning the child,

there is a pause of something like three months. At the end of those three months, the first molars come to the surface; and, at intervals of six months, the canines and second molars respectively,—so that the dentition is usually completed about the end of the second year. If the delicacy of the child, on the one hand, or premature or irregular eruption of the groups of the teeth, on the other, should disturb our calculations, it may be necessary to modify the ordinary routine procedure; and, in any case, the symptoms of irritation, local or general, to which reference has been made, and which indicate the approaching eruption of a tooth or group of teeth, should be held as warranting us in postponing the period for weaning.

Use of Gum-lancet.—A very limited experience in the treatment of the diseases of infancy is sufficient to show that the eruption of the deciduous teeth is intimately connected with many of the most important of these. It has, on this account, been admitted, from time immemorial, that the management of children during teething is a point which often involves both responsibility and anxiety. It is, however, a matter which can admit of no doubt, that a knowledge of this familiar fact leads in no small number of cases to illogical inferences and slovenly practice. Nothing can well be imagined more irrational than to suppose, that all the ailments which may affect the child during the period of dentition depend upon local irritation, due to the impending eruption of the teeth; and it is scarcely less absurd to conclude, that all irritation is to be relieved by the promiscuous use of the gum-lancet. On the latter point, West well observes that—"such a proceeding is nothing better than a piece of barbarous empiricism, which causes the infant much pain, and is useless or mischievous in a dozen instances, for one in which it affords relief."[1]

So long as the process of teething is going on quite naturally, or is only accompanied with restlessness or slight fever, the less we interfere the better. The progress of the tooth towards the surface is necessarily slow, but the manner in which the tissues of the gum which cover it are gradually attenuated, so as to admit of its final emergence, form no exception to the generally admirable manner in which nature discharges her manifold functions in the animal economy. And yet it is too much the fashion, in many quarters, to have recourse to the lancet in a very large proportion of cases, its use being supposed to be indicated by any, even the most trivial, of the ailments of infancy. In certain cases, it is admitted that the lancet is the proper and only treatment; but, the

[1] See on this subject a very able and exhaustive series of papers "On the Dangers of Dentition," by Dr. James Finlayson, in the Obstetrical Journal for 1873-74.

more carefully we watch the natural process, the more cautious do we become in resolving upon lancing the gums of an infant. The conditions which may be admitted as warranting the operation are mainly these: 1st. When the child is suffering, and the tooth is so nearly through that we are sure that cutting down upon it will at once relieve the tension, and permit of the passage of the tooth: 2nd. When the gums are swollen, hot, and tender, and obviously more vascular than usual; but in this case we operate, not with the view of bringing the tooth through, but to give relief to local symptoms, upon which constitutional disturbance may be supposed to depend: 3rd. The occurrence of convulsions during one of the periods of active dentition is generally, and with perfect propriety, looked upon as justifying us in using the lancet, even although the state of the gum may not seem to warrant the operation. This we do, less from a conviction that the procedure is likely to be efficacious, than in the hope that it may prove so. When a tumid state of the gum is associated with aphthæ, or with that severe variety of inflammation of the gum to which in infants the name of Odontitis has been given, the use of the lancet, far from being beneficial, only makes matters worse. And where, in the case of tense and swollen gums, it is employed, not for the purposes of scarification, but in the expectation of bringing the tooth through, there is some reason to fear—and, indeed, this is a point which is very generally believed—that an incision of this kind may result in a cicatrix, ultimately rendering the passage of the tooth through the gum more difficult than if we had left it untouched.

The mode of cutting the gum varies according to the nature of the tooth over which we are operating. In the case of the incisors, the incision should be longitudinal, and directly along the cutting edge of the tooth. As regards the molars, again, it is usual to make a crucial incision. While we are inclined to think that the idea of a cicatrix in the gum proving a serious obstacle has been in some degree exaggerated, we think that it is well to avoid, if this be practicable, the possibility of any such result. This may be done in a very simple way by so operating, when we cut or scarify the gums with the mere object of depletion, as to avoid that portion of the surface through which the tooth must ultimately pass. We have generally found that scarification practised, not over the alveolar ridge, but near the base of that portion of the gum which is chiefly affected, has a perfectly satisfactory effect, and, besides, this will also be found in most cases to be attended with a more considerable flow of blood than when we proceed in the usual way. It often happens that the effect of scarification of the gums, although marked, is but temporary, and, on that account, it is frequently neces-

sary to repeat the operation again and again, to subdue symptoms which are exceedingly apt to recur.

In the treatment of Odontitis, the lancet should be scrupulously avoided, as there is here a tendency to the formation of troublesome ulceration at the site of any incision or scarification which may be practised. Our attention should, in such cases, be directed to the state of the digestive functions; and, by a careful regulation of the diet and otherwise—while the local affection is to be met by the application to the affected surface of a solution of borax, with or without the chlorate of potash—the symptoms will generally in some degree be controlled. The latter drug may also be given internally, in the manner suggested by Dr. Hunt, in doses of two grains every four hours.

CHAPTER XL.

PHLEGMASIA DOLENS.

*The Puerperal State in its Relation to Disease.—*PHLEGMASIA DOLENS: *Nomenclature.—Causes; after Labour, and when Unconnected with Delivery.—Symptoms: Premonitory Signs: Pain: White Swelling: Tension: Heat: Constitutional Symptoms: The Limb Pits on Pressure during Convalescence: Loss of Power in the Limb.—Morbid Anatomy: Character of the Effused Fluid: Plugging of the Veins: State of the Lymphatics.—Pathology: Milk-Leg: Angeioleucitis: Crural Phlebitis: Experiments of M'Kenzie and H. Lee: Views of Tilbury Fox: Review of the Pathology of the Subject.—Treatment; Is Blood-letting justifiable? Blisters: Bandaging: Is Contagion Possible? General Treatment to be directed as a rule to a Condition of Debility: Tonic Regimen: Antiseptic Remedies.—Causes of Protracted Convalescence.*

PASSING now to the consideration of what are essentially Diseases of the Puerperal state, we observe that, apart from such affections as are assumed to belong to the condition referred to, there is ample evidence of a peculiar constitutional sensitiveness, one effect of which is to increase the gravity of symptoms arising from what, under other circumstances, we would call quite ordinary diseases. There is, in fact, no disease to which a recently delivered woman is not as liable as others, but in her case there is this special danger, that what we would call but a trivial ailment may, in consequence of the special conditions under which she is placed, be attended with symptoms of serious and alarming import. An ordinary catarrh, for example, may so disturb that repose of the functions, which seems to be a prominent characteristic of the puerperal state, that an amount of constitutional disturbance is produced, out of all proportion to the essential nature of the disorder. A state which is naturally one of calm quiescence is changed to a condition in which a turbulent circulation, arrested secretions, and violent fever, give no small cause for anxiety; and it is

on this account that we so carefully guard against the occurrence of such influences as may change the case at once from a favourable into an unfavourable category. All ordinary diseases, then, which are accompanied with what are called febrile symptoms, are looked upon with considerable apprehension, as they are apt to be accompanied, in the special cases in question, with a train of supernumerary symptoms which are held as characteristic of the puerperal state.

It is, perhaps, in a sense, not too much to assume, that what are called the diseases of the puerperal state are merely more marked illustrations of the condition to which we refer. The peritonitis, the metritis, the mania of a puerperal patient, are thus nothing more than familiar diseases modified by special conditions, one of which is what we have ventured to call, for lack of a better name, a peculiar constitutional sensitiveness. We are amply warranted, however, as the sequel will show, in considering each of these affections with reference to the period succeeding delivery; and we shall find that, not only are the symptoms modified, but they are so to such an extent as to require, in many cases, a treatment quite different from that which is supposed to be applicable to the disease in its ordinary form.

Nomenclature.—Phlegmasia Dolens, or Phlegmasia Alba Dolens—the disorder which forms the subject of this chapter—forms no exception to the rule just stated. It is, indeed, more strictly a disease of the puerperal state than many of the affections which we shall have to consider, inasmuch as it is seldom observed save as associated with recent delivery. That the puerperal state is not, however, essential to its manifestation is universally admitted, as it is sometimes met with in women who have never been pregnant, and even in persons of the opposite sex. Few diseases have had a greater variety of designations applied to it than this; *anasarca serosa*, *phlegmasia lactea*, *œdema lacteum*, *white leg*, and *crural phlebitis*, being but a few of the many appellations under which it has been described, a study of which, indeed, is not uninstructive, as it almost gives an epitome of the various pathological theories which have been successively advanced to account for the somewhat peculiar phenomena of the disease. Excluding the very few cases in which it, or a precisely similar condition, has been observed to attack the arm, phlegmasia dolens consists in a white, painful swelling of the leg. Although, as we have said, it is not necessarily associated with the puerperal state, it is almost always observed in women who have been recently confined, the period of its occurrence varying from the fifth to the thirtieth day, and, in very exceptional cases, at an earlier or later date than the extremes mentioned. It is more common in pluriparæ than in primiparæ, and is more likely to occur in women

who are of a feeble and delicate constitution than in those who are robust. In a very considerable number of cases, it has followed the various accidents and complications of delivery, and has been noticed to occur more frequently after removal of a retained placenta. All English writers on the subject agree in asserting that it usually attacks the left in preference to the right leg, which Mr. White of Manchester seemed to think was due to the fact of women in this country habitually lying on the left side during labour; while Dr. Ramsbotham supposed that it "may possibly, in some inexplicable manner, be dependent on the different distribution of the right and left spermatic vein—the right terminating direct in the vena cava, the left in the renal."

Causes.—In no class of cases has it been so frequently observed as in women whose strength has been reduced to a low ebb by hæmorrhage, either during or after labour; and this, no doubt, accounts for the observation made by Merriman that it is relatively of common occurrence after placenta prævia. Women who have once suffered from phlegmasia dolens are by no means so liable to it in subsequent pregnancies as we might perhaps be disposed to anticipate; and it has generally been observed that, when it does so recur, the subsequent attacks are much less violent. Mr. White says that he never knew it happen to a woman more than once; but this does not tally with the experience of most modern practitioners. One very troublesome and annoying peculiarity of this affection, is the tendency which the disease has, after having partially run its course in one leg, to be transferred to the other, and there pass through the same tedious stages, still further reducing the strength of the woman, and postponing the period of her convalescence—it may be by several months.

It may be interesting here to mention the circumstances under which phlegmasia dolens has been observed when unconnected with recent delivery. Puzos and, since his time, many modern writers have recorded cases in which all the usual phenomena have been manifested in the course of pregnancy. In a more considerable number of instances, it has been observed as occurring after abortion, particularly in cases in which the placenta or any other portion of the ovum has been left behind. It has also been found to occur after the removal of polypi, the enucleation of myomatous tumours, and the operation of lithotomy. In another class of cases, to adopt the classification of Dr. Tilbury Fox, it may be met with as part of a *general* disease. Under this head he includes those instances in which it has been developed as one of the distressing phenomena of puerperal fever; and, occasionally, in cases of ordinary continued fever, a similar com-

plication has been found to arise. With this variety are ranged three cases in which it was observed to co-exist with dysentery, erysipelas, phthisis, and what Dr. Humphry described as a "preternatural coagulability of the fibrin of the blood." A considerable number of instances have been recorded in which the disease has been associated with malignant growths, not in the pelvic region merely, which we could more readily understand, but as affecting distant organs, such as the stomach or the mammary gland. In a third class of cases, still observing the classification of Dr. Fox, phlegmasia dolens is met with as complicating other *local* diseases; and under this head are ranged, and all on sufficient authority, examples of iliac abscess, suppressed menstruation, hæmorrhoids, hepatic disease, and dislocation of the shoulder. It has also been observed in connection with pleurisy and pneumonia. These exceptional cases have, as we shall find, an obvious and important bearing on the hitherto obscure pathology of the affection.

Symptoms.—As in most other diseases, the violence and typical distinctness of the symptoms of phlegmasia dolens vary considerably; and, in some cases, they are so feebly marked, that we have difficulty in determining whether the case should be classified under this head or should be considered as a simple case of œdema. In an ordinary case, the symptoms may either come on suddenly, when they are often ushered in by a rigor of some severity, or they may manifest themselves more insidiously, when certain premonitory signs are frequently noticed. These are, generally—in the puerperal variety, to which we shall in future exclusively refer—a feeling of weight and discomfort in the hypogaster, extending round the brim of the pelvis, which is soon replaced by actual pain, accompanied with more or less of constitutional disturbance. The pain is commonly referred more particularly to the inguinal region on the side which is about to become the seat of the disorder. We have more than once noticed that pain is complained of in the region of the hip joint; but, as this is not mentioned by other writers on the subject, we infer that the occurrence is exceptional. Dr. Denman describes, as a premonitory symptom, that "before the appearance of any swelling, or sense of pain in the limb about to be affected, women become very irritable, with a sense of great weakness, and grievously oppressed in their spirits, without any apparently sufficient reason; complaining only of transient pains in the region of the uterus, and from these the approach of the disease has frequently been foretold." The pain commencing, as has been described, in the inguinal or pelvic region, extends downwards, and as the various districts of the thigh and leg become successively invaded by it, the swelling of the limb steadily advances in the same direction, until, at the height of the

disease, the whole limb presents the white, glazed, and sometimes enormously swollen condition which is so eminently characteristic. This is further accompanied by a complete loss of power, the patient being quite unable to move the limb, or indeed to change her position in bed without assistance. The tissues are tense and elastic, but, although they yield before the finger, they do not pit on pressure after the swelling has assumed its characteristic appearance. The temperature of the limb is usually increased. Pulse rapid 120

Notwithstanding the great swelling of the limb, the veins can generally be distinctly felt, hard and rolling under the finger like a thick cord. This is more particularly the case in regard to the femoral vein, which may often be traced from the groin downwards, although the pressure gives rise to considerable pain. The swelling in some cases extends to the hip and vulva. The glands of the groin participate in the irritation, and sometimes become affected with well-marked inflammatory action, although they very rarely suppurate. The action obviously extends to the lymphatics, and, sometimes, the only appearance which varies the surface of the white limb, is a faint red streak here and there, indicating the situation of the affected vessels. A similar appearance, which in this case is more diffused, has also been observed over the course of the venous trunks. It was first remarked by Dr. Stokes—an observation which has been corroborated by Dr. Churchill—that the amount of the swelling is no proof of the severity of the disease; but that, on the contrary, "the severity of the constitutional symptoms is often inversely as the swelling of the limb."

In a certain number of cases, the symptoms run a somewhat different course. Obviously, in the instances referred to, the disease does not originate in the pelvis, and is ushered in by no such preliminary pelvic symptoms as have been described above. "Sometimes," says Burns, "there is no uneasiness in the belly, and the first symptom is sudden pain in the calf of the leg. Within twenty-four hours after the pain is felt, the limb swells and becomes tense; it is hot, but not red—it is rather pale, and somewhat shining." It is a matter of considerable importance that the peculiarities of this variety, which is by no means uncommon, should be borne in mind; for otherwise the idea of "crural phlebitis," which has been very commonly supposed to express the pathology of the disease, might altogether divert our attention from symptoms which are nevertheless identical, in all important particulars, with those which are truly characteristic of phlegmasia dolens, the only difference being that, in the cases which we are here considering, the disease begins below and thence extends upwards.

The constitutional symptoms are just such as one might anticipate

from a local affection of such importance. The lochial and lacteal secretions are either arrested or modified, and, in the case of the former, the discharge sometimes becomes offensive. The degree of the fever is indicated by the frequency of the pulse, which is seldom under 120. The complete loss of appetite, the furred tongue, and the state of the evacuations, all show how much the gastro-intestinal functions are disturbed. The patient is restless, sleepless, and complains much of thirst.

After a time, which varies much in different cases, all the symptoms undergo an improvement. The fall of the pulse and the subsidence generally of the constitutional symptoms, are accompanied both by relief of pain and a diminution in the swelling of the leg. A remarkable change now takes place in the character of the swelling, as it is no longer elastic and resistant, but pits on pressure like ordinary œdema; and this change is sometimes observable before there is any very marked difference in the size of the leg. The loss of power in the limb, most marked in cases where the swelling has commenced at the groin, is often very persistent, and is one of the last symptoms to yield. We may expect, therefore, occasionally to meet with cases in which, in the absence of all evidence of constitutional disturbance and, apparently, of local change, this paralyzed condition of the leg remains for months and even for years. In some cases of exceptionally long continuance of immobility, there remains a permanently thickened condition of the tissues, which may somewhat increase the circumference of the limb. In most cases, the ordinary sensibility of the leg is affected for a considerable time, and the patients often complain of what Dr. Churchill graphically describes as a *wooden* feel, which may persist in a degree for a long period. A varicose condition of the veins has been sometimes observed after phlegmasia dolens, which has been supposed by some to be due to a special morbid condition.

But, while the great majority of cases thus end in resolution, and ultimately in satisfactory although possibly tardy convalescence, it is not always so. For, in a few, suppuration occurs, in the limb itself, in the inguinal glands, or within the pelvis, in which last case it may be difficult to say which is the primary and which the secondary disorder. As the result of such suppuration, and, in some very rare instances, of gangrene, the exhaustion is so great that the patient succumbs; but, so uncommon is such an event, that the opportunities which have been afforded for the examination of the white leg after death are extremely rare. Let us see, however, what are the facts which morbid anatomy has disclosed.

Morbid Anatomy.—"On opening the limb," says Churchill, "it is

found to be distended with serum, effused into the cellular membrane." This assertion is no doubt correct, but it is incomplete, and, being so, is apt to lead to an erroneous assumption. The words quoted will serve equally well for the description of what is observed when we cut into a part distended by ordinary œdema; but the symptoms already detailed show one thing at least very clearly, that phlegmasia dolens is something essentially different from œdema. It has been found, moreover, that the fluid which exudes in the latter condition is watery in its nature; but carefully observed facts have shown that the limb, and especially the fibro-cellular and cutaneous tissues, are distended, in phlegmasia dolens, with a peculiar serosity which is more or less coagulable. Again, thrombosis or plugging of the venous trunks of the limb, usually in the neighbourhood of the groin, has been so constantly observed that it may be assumed as a phenomenon essential to the disease. This may exist with or without inflammation of the coats of the vessels. And, further, the great majority of observers have noted that the lymphatics are also affected, their main trunks and more important glands often yielding evidence of inflammatory action, which, in the latter situation, has occasionally gone on to suppuration.

Pathology.—The symptoms, morbid appearances, and even the varieties in nomenclature, all strongly point to one conclusion—that the pathology of this disease has given rise to many differences of opinion, is in itself peculiar and perplexing, and remains, even at the present time, still somewhat obscure. It was at one time generally believed that the "white leg" was due to the presence of milk in the limb, and the idea was so far favoured by the fact, that, in most cases, the lacteal secretion disappears. It is, however, somewhat surprising to find Puzos and Levret giving their countenance to an idea so absurd; for, although pathology in their days was still in its infancy, their assumption was far less advanced than the views of Mauriceau, who held, at a period seventy years earlier, an opinion which, indeed, comes pretty near some quite modern doctrines, when he describes the accident as one "which often succeeds pain in the ischiadic region, and is caused by a reflux—which takes place on those parts—of the humours which ought to be evacuated by the lochia." The believers in this theory of a metastasis of the milk recommended that the child should be kept constantly to the breast.

Towards the end of the last century, the subject attracted considerable attention in this country. Mr. White of Manchester then advanced the theory that the disease depended on obstruction, or on some other morbid condition, of the lymphatic vessels and glands of the affected part; and subsequent writers suggested rupture of the lym-

phatic vessels, or an inflammatory condition of the same parts, as the morbid lesion to which the familiar phenomena of the disease were, at least primarily, to be attributed. The opinion adopted by Dr. Hull was, that phlegmasia dolens consists "in an inflammation of the muscles, cellular membrane, and inferior surface of the cutis, extending, in some cases, perhaps, to the large blood-vessels, nerves, lymphatics, and glands." This, which was sarcastically called by Davis, "Dr. Hull's *capacious* theory," indicates a belief that the disease is due to inflammatory action, but it otherwise throws no light upon the subject. Up to this time, no suspicion seems to have been entertained as to the part which the veins take in the production of the symptoms. The priority of publication on this subject is due to M. Bouillard, who, about the end of 1822, related several cases and dissections—which were shortly afterwards published in the Archives Générales—in which the crural vein was obliterated, and in regard to which he expressed a belief that the peculiar symptoms of this disease were due to obstruction of the venous trunks. Several years before this, the attention of Dr. Davis had been particularly attracted to this subject, in consequence of the death of a patient of his from phlegmasia dolens, but his essay was not published till some months after the date of M. Bouillard's communication.

In the case in question, a very careful dissection was made by Dr. Davis, assisted by Mr. Lawrence, in the course of which it was demonstrated that "the femoral veins, from the ham upwards, the external iliac, and the common iliac vein as far as the junction of the latter with the corresponding trunk of the right side, were distended, and firmly plugged with what appeared a coagulum of blood. The femoral portion of the vein, slightly thickened in its coats, and of a deep red colour, was filled with a firm bloody coagulum, adhering to the sides of the tube. The trunk of the profunda was distended in the same way as that of the femoral vein; but the saphena and its branches were empty and healthy." Ultimately, Dr. Davis advanced the theory that phlegmasia dolens is essentially *Crural Phlebitis*, and under this name, as a synonym, the affection was till quite recently described by English writers.

Although, for a time, the authority of Dr. Davis, supported by the corroborative testimony of Dr. Robert Lee and others, seems to have checked further inquiry, and to have resulted in a general belief that what had been for so long a physiological problem was at last solved, many of the best pathologists were still dissatisfied with the phlebitic theory, and we believe with good reason. Virchow was one of the first to point out—what has since received ample corroboration—that, in

phlegmasia dolens, inflammatory changes in the vessels may be altogether absent. In other words, thrombosis is not necessarily preceded, although it may be followed, by inflammation of the coats of the vein where the obstruction has taken place. In this country, Dr. M'Kenzie took a prominent part in opposition to the views which were generally admitted. In the course of a very painstaking investigation of the subject, conducted, to a great extent, in the form of experiments on the lower animals, the inferences which he ultimately drew from his labours were as follows: "1. That inflammation of neither the iliac nor femoral veins would account for, or give rise to, phlegmasia dolens; 2. That the extensive obstruction of the veins met with in this disease is not producible by merely local causes, such as injury or inflammation of these vessels; 3. That irritation of the lining membrane of the veins, independently of such local injury or inflammation, will only give rise to obstruction of these vessels, to an extent commensurate with that of the irritation which may have been excited within them; 4. That extensive irritation of the lining membrane of veins, giving rise to obstruction and all the phenomena of phlebitis, may be excited by the presence of various unhealthy matters in the blood circulating with this fluid, and determined upon particular portions of the venous system; 5. That the origin of the disease is therefore to be sought for rather in a vitiation of the circulating fluid than in any local injury, inflammation, or disease of the veins."

Mr. H. Lee also performed a series of experiments conducted on a somewhat similar principle. His observations were meant to show, and, in point of fact, did clearly show, that it is by no means an easy matter to excite inflammatory action in the lining membrane of veins, even although irritant or septic substances be introduced into the veins and brought directly into contact with their lining membrane. These results are in perfect harmony with those which, quite independently, were obtained by Dr. M'Kenzie. Experiments were also devised by the latter with the view of determining the effect of irritation on the external coats of the veins; and, although he injured and irritated their coats in various ways so as to excite localized inflammatory action, he found that such inflammation showed little tendency to spread, and that the lining membrane remained free from any effect arising from the irritation applied to the external parts of the vessel. Dr. M'Kenzie quite admits that coagulation of the blood contained in a vein is one of the phenomena of true phlebitis; but he insists, and, we think, proves, that changes in the blood, due to septic action, may produce thrombosis with equal certainty. The effect of an admixture of pus in precipitating the fibrin is clearly demonstrated in the follow-

ing experiment, which is one of those performed by Mr. H. Lee:—"Some blood was drawn from a healthy horse, and poured into three vessels, capable of containing three ounces each. The blood in the first vessel was allowed to remain as a standard of comparison. To that in the second vessel was added some viscid matter from an indolent tumour in the horse's neck; to that in the third, some pus from a chronic abscess. The contents of the third vessel (blood and pus) began to coagulate in three minutes; the mass was firm in four. In eight minutes the contents of the first and second vessel had become firm."

Dr. Tilbury Fox, in two very able papers communicated to the Obstetrical Society of London in 1861, and published in their Transactions for that year, enters very fully into the subject, and strongly opposes the view that phlebitis is an essential phenomenon of phlegmasia dolens. His leading idea is that the cause of the peculiar phenomenon of white leg "is an impediment to the return of blood *and lymph* from the affected part;" and he goes on further to observe, "that the causes of such impediment may be, so far as regards the vessels, *extrinsic* and *intrinsic*." The extrinsic causes comprise all cases of pressure on the vessels from tumours, abscess, &c. The intrinsic causes, again, are all assumed to produce coagulation, and the more important of these are:—1. Phlebitis, septic or non-septic; 2. Introduction of morbid matter into the vein, producing simple thrombus, but not phlebitis; 3. Preternatural coagulability of the fibrin of the blood, as assumed, and, in a manner, proved, by Drs. Humphry and Graily Hewitt. While not denying the possibility of crural phlebitis being associated with, or even preceding, the phenomena of phlegmasia dolens, Dr. Fox argues, with much force and ability, in favour of the conclusion that a septic action proceeding from the denuded inner surface of the uterus is the most probable cause of the disease. With reference to this he writes as follows:—

"It can in no wise be denied that the parturient woman is a subject apt for the occurrence of thrombus; there is hyperinosis, the uterus offers a denuded stop (stump?), its veins are thin, osmosis is easy, the lymphatic act and circulation are active in removing the disintegrating uterus in conjunction with the veins, &c. These constitute an analogous condition to that stage in which phlegmasia dolens is wont to occur elsewhere,—I mean the ulcerative stage and kind of disease, *e.g.*, dysentery, cancer, phthisis,—so much so that we should not expect it to occur when wound is absent, except from extrinsic pressure. This close relation of wound in the one case—phlegmasia dolens,—and the absence of it in the other—œdema,—is a contrasting difference in the

pathology of the two states; in other words, where wound is, the lymphatics are involved. Now for the culminating point,—the cause of the rapid absorption. I have been particularly struck, in the cases that have come under my notice from the outset, by the occurrence of notable hæmorrhage, or profuse discharge of some other kind; and I find, from close inquiry, that the reminiscence of the practice of others, well able and qualified to give an estimation of the point, affords the like result. I have been desirous for some time to ascertain if there be any relation between the two phenomena—discharge and phlegmasia dolens. My belief is, that the cases which cannot be accounted for by the existence of phlebitis or pressure, are due to simple coagulation, the result of tolerably rapid absorption of morbid fluid; this excess of absorption, over and above what is natural, being induced by the occurrence of notable sudden discharge,—the latter being the culminating point in the causation. We do find present facility for rapid absorption, wound, and morbid fluid, in the cases in which phlegmasia dolens, of the type under discussion, occurs. Of course, this is at issue with Dr. Humphry, who, in his pamphlet, says that there certainly seems no reason to attribute the affection to an introduction of pus, or other morbid fluid, into the circulation."[1]

Dr. Fox sums up his conclusions, with reference to the disease under consideration, as follows:—"Prop. I. In phlegmasia dolens both veins and lymphatics are obstructed. Prop. II. The obstruction may be due simply to extrinsic pressure. Prop. III. Or to inflammatory changes in the coats of the vessels, leading to coagulation. (This depends upon virus action.) Except during epidemics of puerperal fever, this is not so common as supposed. Prop. IV. It is pretty well admitted that rapid ingress of abnormal fluid, suddenly, and in large amount, will cause instantaneous coagulation of the blood; and it is also admitted that large drains from the system are followed by rapid and compensating absorption. There is good reason for believing that these conditions are fulfilled, in a perfect and ample degree, in conjunction with the presence of wound,—facilitating absorption,—in a great many cases prior to the occurrence of phlegmasia dolens, and that the latter is frequently thus evolved. Prop. V. These different modes of evolution may be more or less conjoined."

On a review of the whole subject, and setting aside such of the older theories as are clearly incompatible with the possibilities of modern pathology, we cannot but admit that phlegmasia dolens is still a matter in regard to which we have something to learn. That thrombosis of the venous trunks, from whatever cause arising, is essential, we do not

[1] Transactions of the Obstetrical Society of London. 1861.

question; but it is clear that this will not account for the phenomena which we observe, since the symptom which, above all others, is held to be indicative of an obstruction to the venous return—œdema, to wit—is, during the active stage of the disease, absent. Nor do we believe that the simple theory of phlebitis can be accepted as a solution of the problem, in so far, at least, as this may be considered the proximate cause of the disease. No one can dispute that phlebitis causes coagulation of the blood contained in the affected vein. In those cases of phlegmasia dolens in which the affection has been associated with the more serious varieties of puerperal fever, clear evidence of inflammation of the coats of the veins has been observed; and the theory referred to has received still further corroboration from the observations of Dr. Robert Lee, who traced such venous inflammation to its most probable source, in the uterine branches of the hypogastric vein.

But, on the other hand, it has been satisfactorily demonstrated, both by Dr. M'Kenzie and by Mr. H. Lee, that the veins, and especially their lining membrane, are singularly averse to taking on inflammatory action; and it has also been shown, with almost equal certainty, that the deeper colour of the membrane referred to is not a necessary indication of inflammation, but is due rather to the action of the colouring matter and the contact of the clot. But, were we even to admit that phlebitis is an essential part of the disease now under discussion, there is no sufficient evidence that the one condition depends upon the other. If we study the description given by surgical pathologists of the affection known as "fibrinous phlebitis," with which alone phlegmasia dolens can fairly be compared, we find that, among the more important of the symptoms which are detailed, swelling of the limb below the affected part and œdema of the surrounding cellular tissue are among those which are most prominently put forward. In no single case, so far as we know, since M. Breschet first demonstrated and named the affection, has phlebitis been described as involving, in the case of a limb, the white, elastic, painful, and benumbed condition which is so diagnostic of the other disease. We do not hesitate, therefore, to reject the term "crural phlebitis" as synonymous with phlegmasia dolens.

While giving every weight to the authority of such names as Denman, Caspar, and Dewees, we confess that the theory with which their names are associated is even less satisfactory than the other, for were we to admit that angeioleucitis may account for the appearance and character of the swelling, this affords no explanation whatever of the fact that the veins are plugged with clots. We may indeed be

perfectly sure that to them the fact last mentioned was unknown; for had it been brought under their knowledge it could scarcely have failed to prove to them that, even if, as Denman said, "the glands and lymphatics of the limb were evidently the parts first and primarily affected," there was something more than this necessary to account for the phenomena ordinarily observed in these cases. What has already been explained, in reference to the symptoms of the disease and the attendant morbid conditions, certainly proves that, in some cases at least, the vessels and glands of the lymphatic system are involved; but probably no one will now attempt to maintain that an inflammation of these structures will, if uncomplicated, account for the white leg of the puerperal state.

On the whole evidence, we are of opinion that the first crude theory of Mauriceau points significantly in the direction to which we may most confidently look for a solution of the difficulties which beset the subject. We do not of course mean that his quaint idea of a "reflux of humours" from the womb upon the limb was, in the sense which he attached to the expression, a pathological speculation which modern experience can justify; but rather that, in thus pointing out a possible connection between a local lesion and a septic action, starting as in other analogous cases from the wound, he indicated, in a striking manner, the direction in which we should seek for a solution of the problem. There is abundant evidence to prove that septic agents of various kinds may cause coagulation of the blood. The experiments of Mr. H. Lee, already alluded to, showed that pus produced this effect. Dr. M'Kenzie ligatured the left femoral vein of a dog and injected half an ounce of a solution containing lactic acid. The animal died in half an hour, and on examination it was found that "the iliac veins on the left side from the femoral up to the cava, and a considerable extent of the cava, were obstructed by what appeared to be a firm coagulum; and, on opening these vessels, this was found to be closely adherent to their lining membrane." An exceedingly interesting case, bearing on the same point, is given by Dr. Tilbury Fox, of a lad aged twelve years, who, being bitten in the thumb by an adder, presented next day "a perfect and complete specimen of phlegmasia dolens" in the affected limb, so that we may assume that coagulation had been at least one of the results of the poison which was introduced in the manner described.

On the whole, therefore, we think that the preponderance of evidence is in favour of the idea that, in most cases of phlegmasia dolens, there is a precipitation of the fibrin by the action of some septic agent which has made its way into the blood, or has been developed in that medium.

In this sense, Virchow's theory, "that the first pathological condition is the formation of a clot in the vein," may be accepted as highly probable. Certainly this is more likely than that true phlebitis is essentially the proximate cause, although no one can dispute either that phlebitis may cause coagulation, or that inflammation of the vein tissues may accompany the other and more essential phenomena of phlegmasia dolens. It may obviously, and with perfect propriety, be urged against this theory that a septic action having its origin in a wound cannot apply to those cases in which the symptoms of undoubted phlegmasia dolens manifest themselves unconnected with the pregnant state. But we cannot see that this must necessarily be admitted as a serious difficulty; for, if the proximate cause of the disease is assumed to be a septic action, proceeding in a great majority of cases from a recently denuded surface, it is surely not too much to assume that, in exceptional cases, the septic action which leads to coagulation may proceed from intrinsic causes, or even from poison introduced in some other way from without, as in Dr. Tilbury Fox's case above alluded to.

It is, however, impossible to avoid the conclusion that a septic action and the resulting coagulation cannot satisfactorily account for all the phenomena of the disease. All that is necessarily involved in such an hypothesis is mechanical obstruction in a venous trunk, from which we could only anticipate œdema as a direct result. To the development, therefore, of the white elastic swelling, something more is required, and this forces upon our notice the inquiry as to what are the auxiliary or supplementary conditions referred to.

No modern writer on the subject ventures to advocate the theory, which at one time had the support of the most distinguished obstetricians of the age, that the seat of the disease is essentially in the absorbent or lymphatic system. The facts demonstrated with reference to the veins preclude such a belief. But it by no means follows that the absorbent system takes no share in the development of the symptoms alluded to. The red streaks occasionally observed over the course of the larger lymphatic vessels, and the exceptional occurrence of inflammation and suppuration in the glands, prove quite clearly that they may be involved. But there are other considerations which seem to indicate something more than this, and that an affection of the lymphatics is an essential, although, probably, a secondary part of a typical case of phlegmasia dolens. If we assume, as some of the most distinguished of modern pathologists have done, that the lymphatic system affords the channel through which fibrin is introduced into the blood, we can readily understand why an obstruction in the vessels of that system, whether inflammatory in its nature or purely mechanical,

may cause many of the essential phenomena of the disease. Plugging of a venous trunk could but cause œdema; but venous obstruction, *plus* an impediment to the circulation in the lymphatic system, may quite readily be assumed to cause symptoms very like those which we have already described. "If there be any relation," says Dr. Fox, "between the lymphatic fibrin and the cellular tissue, it is easy to understand how obliteration of the lymphatics may give rise to the peculiar character of phlegmasia dolens, on account of the retention of the fibrinous material in the tissues—the cellular especially, which is so rich in lymphatics. . . . . The cellular tissue itself seems to be hypertrophied, the lymph also gelatinizing in its interstices."

The marked loss of power in the affected limb, out of all proportion to the mere amount of swelling, and which is, as we have seen, frequently of long continuance, seems, at one time, to have led to the idea that the nerves were primarily involved; and M. Dugès has certainly shown that, in some cases at least, inflammation of the nerves and of their sheath occurs. It seems to us, however, that serious lesion of the nervous trunks is, even from a purely theoretical point of view, by no means necessary to the temporary paralysis so characteristic of the disease. All, in fact, that is necessary to the arrestment of the nervine functions is pressure; and, in the condition to which the parts are reduced in the rapid development of a tense swelling, we may be sure that the nerves can scarcely escape such pressure as may produce the effect to which we refer.

The confusion which has so long prevailed in regard to the pathology of phlegmasia dolens seems to have been due, in a considerable degree, to the obstinacy with which pathological theories were pinned to affections of the individual tissues or textures. No such theory can, as it seems to us, satisfactorily account for what, in these cases, we observe. It is, no doubt, of great interest to determine, if we can, what part or parts of the animal economy are primarily involved; but we may be quite sure that, if we take up any exclusive theory, as to the disease being one of a single fluid or a single texture, we pass into a field of speculation which is little likely to lead us to the truth. Doubtful though many points in regard to its pathology may be, we have no difficulty in refusing to admit of Crural Phlebitis, or Angeioleucitis, as terms which represent the true nature of phlegmasia dolens. Either of these conditions may, no doubt, exist, but, if it be so, they are secondary rather than essential. Thrombosis, or obstruction otherwise to the venous return, is apparently essential, and, in so far as the absorbents are concerned, it is possible that Dr. Tilbury Fox is correct in assuming

that a similar obstruction is produced in them. But, as regards the latter, no plugging of lymphatic trunks has ever, in so far as we are aware, been demonstrated. Nor do we believe that it has been established that the disease is inflammatory in its origin, nor even that the inflammatory process is, at any stage, an essential pathological condition. On the contrary, we think that we perceive, in the narrative of post-mortem appearances in fatal cases, another and a very obvious source of error. That morbid appearances indicating inflammatory action have been frequently observed after death, we can well believe; but we must bear in mind that fatal cases are rare, and that, in ordinary cases, even when severe, there is rarely evidence, during life, of any such action. We demur, therefore, to the conclusion, that in the morbid phenomena of exceptionally severe cases, we have a demonstration of the essential features of what we have called an ordinary or typical case. Inflammation, in fact, we take to be—whether it is observable in the veins, the absorbents, or the contiguous tissues—an exceptional and essentially a secondary occurrence.

Treatment.—The fact that phlegmasia dolens follows in so large a proportion of cases upon a condition of debility and exhaustion, usually produced by hæmorrhage, shows pretty clearly that the case is not one for an antiphlogistic regimen. This may be conceded even by those who believe most implicitly in the inflammatory nature of the disease; and the opinion must necessarily gain strength if we assume that a septic action proceeding from, or associated with constitutional exhaustion, is an essential part of the disease. A belief in the inflammatory theory has not unnaturally led to a very general impression that blood-letting should usually be adopted. Few persons in the present day would probably think of general blood-letting, but it is commonly taught that leeches should be applied over the course of the affected vein; and, indeed, the rules for treatment which are laid down by many writers on the subject are such as to convey the impression that leeches are applicable to all cases. Such an idea is, of course, at variance with the view which we have expressed as to the nature of the disease, and cannot, certainly, be admitted as a safe guide to judicious treatment. The cases, in fact, to which the application of leeches is advisable are those only in which there is evidence of a local inflammatory action, which may very readily be induced under such circumstances, either in the lymphatics or in some other of the tissues of the limb. But even a clear indication of true inflammation does not necessarily warrant depletion, for we must first—and this is the most important point of all—be sure that the affection has not sprung from debilitating causes; for, if it be so, to bleed is simply to encourage exhaustion, and to facilitate

the absorption of septic materials. Blood-letting, then, we believe to be applicable to that comparatively rare class of cases only, in which inflammation exists in the absence of constitutional exhaustion.

Considerable benefit appears to have been derived in many instances from the application of Blisters to the leg. Some have gone so far as to say that, in the treatment of this disease, blisters are to be regarded as specifics, but this is evidently a pardonable exaggeration. They may be applied, as we believe, with a reasonable prospect of success, in cases where there is inflammation, and where the general condition of the patient prevents us from having recourse to blood-letting; and there is certainly one effect upon which we may count with some confidence—that being a cessation, or at least an alleviation, of the pain which is so characteristic a feature of the more severe examples of the disease. Otherwise, the only effect which is likely to be derived from this method of treatment differs in no respect from that which, under similar conditions, we anticipate from the action of counter irritation of any kind. Probably Dr. Churchill is quite correct when he says that, although his own experience is decidedly in favour of the utility of blisters, "in many cases turpentine fomentations will answer equally well."

Bandages, if judiciously employed, are extremely useful in the cure of phlegmasia dolens. To the early stage, while the swelling is rapidly being developed, firm bandaging is, for obvious reasons, inapplicable, and might very possibly be attended with further arrest of the circulation, and sloughing similar to what has occasionally occurred, from careless or unskilful bandaging, in surgical practice. What is, at this period, safer and more judicious is to swathe the limb in fomentations, which, if the pain be severe, may be sprinkled with laudanum. On the subsidence of the more acute symptoms, bandaging may always be resorted to, at first with flannel and subsequently with an ordinary roller bandage. What may be safely held as indicating the period at which bandaging is proper, is when the limb pits on pressure, this pitting being probably impossible until the permeability at least of the lymphatic trunks has been restored.

Certain facts which have been observed with reference to the progress of these cases have suggested a suspicion that, in its more severe varieties, or, it may be, under exceptional circumstances, the affection may be propagated by contagion. That it may be so, when associated with the more serious phenomena of puerperal fever, we can readily believe; but we do not think that there is any evidence which would lead us to suppose that an ordinary case is thus communicable. The assertion has, however, been made upon high authority, and it will thus be well, even should the precaution be deemed superfluous, to take

such means as may render any propagation of the disorder in this manner as little likely to occur as may be possible.

From what has already been said, it may be inferred that the constitutional treatment applicable to phlegmasia dolens is to be adapted far more frequently to a state of general debility than to a sthenic condition requiring antiphlogistic remedies. We speak, of course, of such cases as present the features of an ordinary puerperal case; but we do not mean to deny that exceptional treatment may be absolutely requisite to the proper management of particular cases, where marked local inflammation and accompanying fever of the sthenic type may call for prompt and energetic action. The state of the bowels must be carefully attended to, and, although it will rarely be advisable to give strong purgatives, it is almost always necessary to regulate the discharges by gentle laxatives or enemata, and to maintain them otherwise in a healthy condition. Should the lochia become in any degree offensive, weak carbolic injections may be thrown into the vagina once or twice a day in the usual way. From a very early period of the case, the diet must be generous, and it will often be expedient to give beef tea or stronger soups, and even wine from the first. During the period of convalescence, a similar method of treatment must be persevered in.

A tonic regimen being thus clearly indicated, it is often found necessary to administer iron, quinine, and other tonics. Dr. M'Kenzie, with the view of neutralizing any septic materials which may exist in the blood, recommends the administration, either of hydrochloric acid, or of the sesquicarbonate of ammonia, in full, concentrated, and frequently repeated doses. He directs that "an ounce of hydrochloric acid should be taken daily in a quart of barley or plain water sweetened with syrup of ginger, and flavoured with lemon peel."

It is by no means a rare occurrence that, in cases of this affection, quite unconnected with pelvic abscess or any other secondary affection, convalescence is extremely protracted. This, no doubt, depends chiefly, and in many cases entirely, on the effect which has been produced upon the nerves, resulting, in extreme cases, in actual paralysis of the limb. To the treatment of this condition, stimulating frictions are suitable, and it has also been recommended that, at this stage, a succession of small blisters be applied over the limb at various parts. Nothing is better, in such cases, than tepid sea-bathing, and especially the salt water douche, followed by friction of the parts. There is good reason to believe that, in some instances of slow recovery, this is due to the permanent plugging of the venous trunks, or possibly to their obliteration as the result of inflammatory action. In this case, as after deliga-

Forbid massage or friction. The

tion of arterial trunks, it may be some time before an efficient collateral circulation is established, and the fuctions of the parts are thus but feebly discharged. It is much more probable, however, that changes take place in the clot, which ultimately result in the restoration, partial or complete, of the circulation within the vessel. "The blood," says Murphy, "has the power of separating from itself a fibro-albuminous element without the intervention of any membrane, and independently of any inflamed surface. Through this medium, the coagulum becomes adherent to the sides of the vein (as in the old aneurismal sac); and, if it be attached to the whole circumference, the inner portions become softened and broken down. A complete cylinder of fibrin may, in this way, be formed in the interior of a vein, through which (when the fluid portions of the coagulum are removed) the blood will circulate." We need scarcely wonder, then, that the results of treatment are often unsatisfactory, and convalescence proportionally tardy.

CHAPTER XLI.

PUERPERAL INSANITY.

Nomenclature.—Normal Effect of Pregnancy on the Mind.—Insanity associated with Pregnancy, Labour, or Lactation.—Causes.—Pathological Theories.—Connection of Puerperal Insanity with Albuminuria.—PUERPERAL MANIA; *to be distinguished from Phrenitis: is essentially a Disease of Exhaustion.—Symptoms: Significance of a Rapid Pulse: Violence: Delusions.—Prognosis.*—PUERPERAL MELANCHOLIA: *Distinguishing Characteristics: Probable Terminations.—Treatment: Prevention: Blood-letting to be avoided: Management of the Digestive Functions: Emetics: Vascular Sedatives: Nervous Sedatives; Opium, Hyoscyamus, Chloral, &c.: Diet and Regimen: Seclusion and Restraint: Treatment of Melancholia.—Tendency to Recurrence in Subsequent Labours.*

THE term Puerperal Insanity is here chosen in preference to the more familiar designation of Puerperal Mania, for the obvious, and, we think, very sufficient reason, that the forms under which mental aberration may occur, in the puerperal state, are various, and the proportion of cases in which the symptoms are of such a nature as to fall under the category of Mania, is by no means so overwhelming as to justify the exclusive use of that name.

It requires no very close observation of pregnancy and the puerperal state to discover that the mental as well as the bodily functions are, in a very considerable proportion of all cases, disturbed. The psychological phenomena to which we here refer, far from being symptomatic of mental unsoundness, or what we call insanity, are indicative merely of the presence and operation of some disturbing influence, dependent, doubtless, upon the condition in which the woman is placed. For example, it is by no means an uncommon thing—as we had occasion to notice in connection with the Signs of Pregnancy—for the temper of the woman to be changed for the worse during the course of a pregnancy.

She becomes fretful, capricious, and, in many indescribable ways, different in temperament and disposition. Further, the emotional faculties are sometimes less under control, when causeless tears or laughter indicate an hysterical disposition; and, in other cases, the organs of special sense, and especially those of taste and smell, are strangely perverted, in a manner which every practitioner has had opportunities of witnessing. We may, therefore, venture to assume that this psychological sensitiveness can scarcely fail, when it exists, in some degree to predispose to a more serious disturbance of the mental faculties.

Mental alienation, associated with the highest function of the generative organs, occurs under a variety of circumstances. It may thus manifest itself during pregnancy, in the course of labour, during the puerperal state, or while the woman is nursing. The insanity of pregnancy is developed, in the majority of cases, between the third and the seventh month. It is generally characterized by melancholia, or by moral perversion, and the result of treatment is, as compared with the other varieties, very satisfactory. What was described by Montgomery as the mania of labour, is rather a frenzy or temporary delirium—the result, probably, of the agony which the woman suffers, or of temporary disturbance of the cerebral circulation. "It is not," he says, "accompanied nor followed by any other unpleasant or suspicious symptom; it occurs, perhaps, after the patient has been talking cheerfully, and, having lasted a few minutes, disappears, leaving her perfectly clear and collected, and returns no more, even though the subsequent part of the labour should be slower and more painful. In every instance which came under my observation, the patients were conscious that they had been wandering and occasionally apologized for anything wrong they might have said, although they were not aware of what the exact nature of their observations might have been." The insanity of lactation has been observed, in a very large proportion of cases, after the sixth month of nursing—a fact which, along with the accompanying symptoms, points clearly to the conclusion that the disease is the result of debility, proceeding from an injudicious prolongation of the period of nursing. It is more frequent in women over thirty years of age, and in those who have previously borne children, but especially so in those who have become repeatedly pregnant at short intervals. In this variety also, the insanity more generally assumes the melancholic than the maniacal type.

Causes.—Puerperal insanity is by no means of rare occurrence. According to Esquirol, about one twelfth of the women admitted to the Salpetrière were clear examples of the disease, while, among the more opulent

classes, the proportion was even higher—nearly one seventh. The statistics of the subject further teach us that primiparæ are more liable than pluriparæ, and that the class of cases in which susceptibility to puerperal insanity is most marked, are those in which women between the ages of thirty and forty are confined for the first time. In a considerable number—it is said, indeed, in about a half of all cases encountered in practice—hereditary predisposition has been noted; and it would further appear that complicated and exhausting labours are much more frequently followed by insanity than those in which the course of labour has been normal. It was first pointed out by Esquirol, and the observation has been confirmed by others, that unmarried women, who feel deeply the degradation of their position, are much more susceptible than others. These, then, in addition to the functional susceptibility which is so characteristic of the puerperal state, may be confidently admitted as predisposing causes. But, as regards exciting causes, and the pathology of the disease, there is little upon which we can rely. Cold, imprudence in diet, sudden mental shock, disordered bowels, and a number of other similar conditions, have been generally assumed as causes of puerperal insanity, but most of them, as it appears to us, on insufficient evidence.

Pathology.—From a pathological point of view, the etiology of the subject is even more obscure. We may readily obtain, by observation, abundant evidence of the sympathy which subsists between the uterus and the cerebrum, and we need, therefore, scarcely wonder that attempts have occasionally been made to connect the mental disturbance with uterine lesion. But, although we may admit that a certain number of authentic cases have been advanced on undoubted authority, and were we even to concede that metritis may apparently be the approximate cause of insanity in some instances, it is abundantly evident that, in the great majority of cases, no such cause exists. Other instances—to which the same observation may apply—have been recorded, in which there was an apparent connection between the mental disorders to which we refer, and ovarian or peritoneal inflammation. Some writers—among whom we may mention Burns and Davis—were of opinion that the disease was of inflammatory origin, and described it as a modification of phrenitis; but modern experience thoroughly corroborates the view which was taken by Gooch, "that the disease is not one of congestion or inflammation, but one of excitement without power,"—an opinion which derives most ample confirmation from the narrative which he gives, in his admirable thesis on this subject, of eleven cases in which there could at no time have been any inflammation of the structures within the cranium. Dr. Ferrier supposed that the loss of reason, in

most cases, was mainly due to some interference with the establishment of the function of lactation.

Connection with Albuminuria.—One of the most interesting of modern speculations, with regard to the pathology of puerperal insanity, had its origin in a suggestion which was made by Sir J. Simpson, that there might be an essential connection between that disorder, and disease of the kidney, or at least the presence of albumen in the urine. That the disease may thus, or in some other way, have a toxæmic origin is, of course, perfectly possible; and the theory has, further, a peculiar interest in connection with puerperal eclampsia, in which albuminuria is a phenomenon familiar to modern pathologists. Simpson's original suggestions on this subject, which were published in 1857, were based upon the observation of four consecutive cases, in all of which he found albumen present in the urine. His subsequent experience, with ample corroborative evidence from other sources, can leave little doubt in the mind that his first idea was correct, and that, between the two conditions, there probably exists an essential though inexplicable bond of association. It would appear that the presence of albumen is only indicated by the usual tests for a short time after the attack commences, and is, therefore, less persistent than in the case of convulsions. "The fire of disease goes on burning," says Simpson, "in these cases of insanity, after the lighted match is merely applied, and the strange morbid clockwork runs on, as it were, after the key that wound it up is withdrawn. I have seen all traces of albuminuria in puerperal insanity disappear from the urine within fifty hours from the access of the malady. The general rapidity of its disappearance is, perhaps, the principal, or, indeed, the only reason why this complication has escaped the notice of those physicians among us who devote themselves with such ardour and zeal to the treatment of insanity in our public asylums."

The same writer, while making no pretence of solving what all admit to be a pathological riddle, seems to think that the cause of this disease may hereafter be discovered by the pathological chemist to consist in certain changes in the renal secretion, involving, secondarily, chemical changes in the blood itself. One well-known effect, which is apt to follow the appearance of albumen in the urine, is a diminution in the quantity of urea excreted. But, as Frerichs has shown, the mere presence of an excess of urea in the blood does not necessarily involve a septic action on the nervous system.

Dr. Donkin contributed a very excellent paper on this subject.[1] Recognising the fact that puerperal insanity may present itself under

[1] Edinburgh Medical Journal, May, 1863.

a variety of forms, he deduces, from the history of recorded cases, facts which appear to him to warrant the conclusion "that the acute dangerous class of cases are examples of uræmic blood-poisoning, of which the mania, rapid pulse, and other constitutional symptoms are merely the phenomena; and that the affection, therefore, ought to be termed uræmic or renal puerperal mania, in contra-distinction to the other form of the disease." Although no one is likely, in the present day, to agree with Dr. Donkin, his paper is replete with interest, and will well repay the trouble of perusing it.

Dr. Fordyce Barker asserts that, in a large number of cases of puerperal insanity which have come under his observation, he has found albumen associated with so small a proportion, that he finds himself compelled to regard it, when present, as simply a coincidence and not a cause. It is his firm conviction that the mental emotions constitute the exciting cause infinitely more frequently than all other causes combined, and he adduces very interesting statistical facts in support of his theory.[1]

Puerperal Mania.—The form of puerperal insanity which is of most frequent occurrence is that in which the symptoms are commonly manifested within a fortnight after delivery, and present with greater or less distinctness the characteristic features of acute mania. It is to this alone—the *paraphrosyne puerperarum* of Sauvages—that the designation "puerperal mania" can with perfect propriety be attached. Of fifty-seven cases noticed by Burrows, thirty-five were maniacal, sixteen melancholic, and eight alternating; and, although the relative proportion of cases has varied according to the experience of various writers, all agree that the maniacal cases are greatly in excess of the others. This is, no doubt, the class of cases, the observation of which by the earlier writers on the subject gave rise to the idea that the violence of the symptoms was due to inflammation. It were absurd to deny that phrenitis is possible in lying-in women, as in others; but no one now questions the accuracy of the statement made by Gooch, "that furious delirium from inflammation of the brain is a rare disease in child-bed." What seems to have given, for a time, apparent confirmation to the inflammatory theory was the fact that, in fatal cases of puerperal mania, the brain was found congested. The experiments of Dr. Kelly upon the lower animals, and a host of pathological facts which have been put on record since his day, have conclusively proved to demonstration—what is familiar to every modern pathologist—that death from hæmorrhage and other exhausting causes, produces in the brain that very appearance of increased vascularity which, as we assume,

[1] The Puerperal Diseases, by Fordyce Barker, M.D. New York, 1874.

was accepted by Burns, Davis, and others, as evidence of inflammatory action.

Although, therefore, we admit meningitis to be classed as a *possible* complication of the puerperal state, there is little likelihood of our diagnosis being obscured by such an occurrence. The very early period of its accession after delivery, and the manifestation of headache, suffusion of the eyes, and other local symptoms referrible to the head, would doubtless indicate the nature of the disease to the judicious practitioner. But not only do we discard the idea of inflammation as pathognomonic of puerperal mania, but we embrace without hesitation a directly opposite view, that the latter is essentially a disease of exhaustion. This is so far indicated by the fact already mentioned, that puerperal insanity in both its forms is more common after exhausting and operative cases, than when the progress of labour has been normal. It is further strongly corroborated by the details of treatment, in which we are not astonished to find that patients fainted after the abstraction of a few ounces of blood; and by the experience of the most reliable modern authorities.

Symptoms.—The symptoms of puerperal mania do not differ in any very essential particulars from those which are exhibited by patients who are the subjects of the same disease, unconnected with the puerperal state. Still, there are peculiarities which are of sufficient importance to warrant a special description of the features of what we may call a typical case. The observer of psychological phenomena does not require to be told that there are great, and even perplexing differences in individual instances. In cases in which an attack on former occasions, hereditary tendency, or any other cause, may particularly direct our attention to the patient; or, when the observer has had much special experience in the treatment of insanity, a certain restless, anxious manner, with more or less irritability, will sometimes presage the coming storm, and certainly one of the worst possible of premonitory symptoms is obstinate insomnia, or unrefreshing rest broken by frightful dreams. We borrow from Dr. Ramsbotham the following graphic description of this, and the subsequent stages of the disease:—

"In mania there is almost always, at the very commencement, a troubled, agitated, and hurried manner, a restless eye, an unnaturally anxious, suspicious, and unpleasing expression of face; sometimes it is pallid, at others more flushed than usual;—an unaccustomed irritability of temper, and impatience of control or contradiction; a vacillation of purpose, or loss of memory; sometimes a rapid succession of contradictory orders are issued, or a paroxysm of excessive anger is excited about

the merest trifle. Occasionally, one of the first indications will be a sullen obstinacy, or listlessness and stubborn silence. The patient lies on her back, and can by no means be persuaded to reply to the questions of her attendants, or she will repeat them, as an echo, until, all at once, without any apparent cause, she will break out into a torrent of language more or less incoherent, and her words will follow each other with surprising rapidity. These symptoms will sometimes show themselves rather suddenly, on the patient's awakening from a disturbed and unrefreshing sleep, or they may supervene more slowly when she has been harassed with watchfulness for three or four previous nights in succession, or perhaps ever since her delivery. She will very likely then become impressed with the idea that some evil has befallen her husband or, what is still more usual, her child; that it is dead or stolen; and, if it be brought to her, nothing can persuade her it is her own; she supposes it to belong to somebody else; or she will fancy that her husband is unfaithful to her bed, or that he and those about her have conspired to poison her. Those persons who are naturally the objects of her deepest and most devout affection, are regarded by her with jealousy, suspicion, and hatred. This is particularly remarkable with regard to her newly-born infant; and I have known many instances where attempts have been made to destroy it, when it has been incautiously left within her power. Sometimes, though rarely, may be observed a great anxiety regarding the termination of her own case, or a firm conviction that she is speedily about to die. I have observed upon occasions a constant movement of the lips, while the mouth was shut; or the patient is incessantly rubbing the inside of her lips with her fingers, or thrusting them far back into her mouth; and if questions are asked, and particularly if she be desired to put out her tongue, she will often compress the lips forcibly together, as if with an obstinate determination of resistance. One peculiarity attending some cases of puerperal mania is the immorality and obscenity of the expressions uttered; they are often such, indeed, as to excite our astonishment, that women in a respectable station of society could ever have become acquainted with such language."

We have no reliable information as to the number of cases which prove fatal, but there is no doubt that one of the most important symptoms as indicating the probability of a fatal result is extreme rapidity of the pulse. "Mania," said William Hunter, "is not an uncommon appearance in the course of the month, but of that species from which they generally recover; when out of their senses, attended with fever like paraphrenitis, they will in all probability die." Gooch

corroborates generally this assertion, and narrates in illustration a very interesting case:—"One evening, several years ago, a surgeon called upon me, wishing me to return with him many miles into the country, to see his wife, who had become maniacal a few days after her delivery. I was at that time attending a lady in her first labour whom I could not leave, but I offered to go with him if he would wait till the labour was over. It was going on wearily, there was no prospect of its being over before the morning, and as he was anxious to return home, he took another physician whom I recommended. Before leaving me, however, he said he should like to talk with me about the case. I took down a volume of Dr. William Hunter's manuscript lectures and showed him this passage (quoted above). He said he was sorry to read it, for that his wife's pulse was very rapid. About a week afterwards, I heard that she was dead." It would appear, however, as if the views of Hunter and Gooch had found too literal an interpretation in many modern treatises, for it would almost seem to be the deliberate opinion of some, that a rapid pulse meant death, and a slow one recovery. The pulse is probably the most certain indication which we have, but it is not to be relied upon solely, to the exclusion of others. Extreme rapidity in the beats is, in this, as in all the other more serious disorders of the puerperal state, a symptom of grave import; but too much has been made of it, and, for our part, we are quite convinced that there are many cases in which the pulse rises above 120, and remains at that rate for days in succession, and yet convalescence is ultimately quite satisfactory. When the pulse suddenly rises at the commencement of the attack, the symptom is undoubtedly more alarming.

In the worst cases, the milk and lochia are entirely suppressed; but this is not usually the case, although both functions are more or less interfered with, the nutritive value of the milk, at least, being generally deteriorated. There is obstinate insomnia, which often defies the calming influence of the strongest drugs. The digestive functions become impaired in a marked degree, the tongue being furred, and the odour of the breath not unfrequently offensive. The urine is scanty and high-coloured, and the alvine evacuations are offensive—there being sometimes diarrhœa, but more frequently constipation. The cases in which the patient is extremely violent are exceptional; but it is often impossible, or at least a matter of great difficulty, to induce her to remain silent or at rest. She insists on rising to discharge some imaginary neglected household duty, and her delusions may turn into all kinds of odd channels. She in many instances refuses food, and it may, on this account, even be necessary to use force in order that such nutriment as

is essential to maintain life may be introduced into the stomach. The delusion, in one very obstinate case of this nature which came under our observation, was, that putrefaction was going on internally, and that food only tended to supply material for the morbific process; and, in other cases, it has been noticed, that, although the patient obstinately refused food when urged to take it, she would, if she could obtain it furtively, take it greedily and voraciously. Again, a prominent characteristic of these cases, which adds greatly to the responsibility of their management, is the undoubted tendency to suicide, which may show itself in many ways, although hidden with all the craft and cunning of insanity.

It has been remarked as a feature characteristic of puerperal mania, that, occasionally, the woman, although her mind is pervaded by delusions, has a strange underlying consciousness that her thoughts and actions are under the influence of some mysterious power. It has been stated, that seldom or never is this *consciousness of a delusion* manifested in other forms of insanity. Gooch states that the symptoms, in some cases observed by him, closely resembled those of delirium tremens, and he has also seen symptoms, of the nature of catalepsy, which were associated with distinct puerperal mania. If we may accept as probable the theory to which allusion has already been made—that albuminuria, in mania as well as in eclampsia, points to the proximate cause—we cannot be astonished to find that clinical experience in some measure seems to indicate a connection between them. We even find, that by some the expression "epileptic puerperal mania" has been employed as indicating the occasional coincidence of the phenomena of eclampsia with those of mental aberration. In some instances, the mania has been preceded by convulsions, while in others, the mental phenomena have been the first to develop themselves.

Prognosis.—The prognosis of these cases involves, as will readily be understood, questions of deep interest in individual instances. As regards the risk to life, it is, as we have attempted to show, an error to suppose that a rapid pulse is necessarily the forerunner of death. But there is another error, which at one time led to a contrary belief. This finds expression in a remark which Dr. Gooch attributes to Dr. Baillie, who, when consulted about a case, remarked "that the question was not whether she was to get well, but when she was to get well." To this Gooch adds drily, "the patient died a week after this prognosis." The fact is, that death from puerperal insanity does now and again occur, and more frequently from the maniacal than from the melancholic form. Dr. Churchill says that he should himself lay great stress, in

forming a prognosis, upon the presence or absence of uterine complication; and the observation, coming from such a source, merits careful attention.

The question of prognosis involves not only the danger to life, but the prospect of speedy restoration to reason. In this respect, in so far as mania is concerned, we may look forward with considerable confidence, especially in the absence of hereditary predisposition, to an early recovery. "Within three weeks," says Dr. J. B. Tuke,[1] "or more frequently earlier, the mania gradually subsides, and is replaced by a state of dementia, generally accompanied by delusions, which almost invariably assume the form of mistaken identity. These gradually disappear, leaving a haziness of apprehension, and a state suggesting the idea of waking from a dream. The patient can now, generally, be induced to work, and otherwise employ herself. From that moment you may look with almost certainty to ultimate recovery." There are cases, however—chiefly those of hereditary taint—in which the delusions become confirmed, and in which, although the general health may have been quite restored, the mental aberration is persistent; dementia, of a more serious nature than that mentioned by Tuke, gradually takes the place of mania, and hopeless chronic insanity is the result.

Puerperal Melancholia.—Although, in the insanity of pregnancy, the majority of cases are of the melancholic type, it is otherwise with true puerperal insanity; where melancholia, although by no means rare, is, as compared with mania, comparatively unfrequent. Few cases which, from the first, come under this category, present characteristic symptoms earlier than the sixteenth day, and a large proportion of cases come on considerably later than this. All at first may go on to our perfect satisfaction: the patient has been able to leave her bed at the usual time; her appetite is good; she sleeps well, and is able to nurse her child; it is assumed on all hands that convalescence has been satisfactorily established. Perhaps a month after the birth of the child, a change comes over the mother, which, to her attendants, is quite inexplicable. The pride and interest in a first-born child gradually fades away, and a cloud of sadness, utterly without cause, slowly spreads itself over the aspect and demeanour of the mother. Causes, which are either imaginary, or, if real, are of the most trivial character, give rise to fits of silent weeping, during which the patient is not demonstrative, and rather avoids than seeks sympathy. The gloom deepens as the curtain falls. No longer does the cry of the infant awaken a tender sympathy in her heart;

[1] Edinburgh Medical Journal, May, 1865.

on the contrary, she maintains a moody silence, and not only never inquires for her infant, but seems to look upon it with actual aversion. Delusions—all of the melancholic type—if they have not already manifested themselves, now become apparent. She believes that in marrying she has violated some important moral obligation. While she heaps all sorts of accusations on her own head, she comparatively rarely complains of others. Too frequently the religious element enters into her morbid ponderings, and she fancies herself lost, and her soul beyond all hope of salvation.

And not by day only, but by night, do these gloomy impressions weigh upon her mind, so that sleeplessness is an early and most troublesome symptom, resisting often all the ordinary methods of alleviation. The appetite fails, or becomes capricious, and she may absolutely refuse to take any nourishment, except upon earnest solicitation, or even the employment of force. As the lochial discharge has most likely ceased before the symptoms of insanity make their appearance, no reference need be made to that; but, as regards the lacteal secretion, it will generally be observed that, even in robust women who previously had an abundance of milk, it is rapidly arrested, and the breasts become flaccid. The bowels are sometimes tolerably regular, but, as a rule, are constipated, and the dejections fœtid. The urine is high in colour and scanty, unless there is an hysterical element in the case, when there may be a great flow, of a low specific gravity. The pulse may be accelerated, but is seldom so continuously. In some instances, symptoms of moral insanity are prominent. In cases in which there has been—even long previously—a tendency to intemperate habits, these may re-appear, in the earlier stage, in the form of aggravated dipsomania, in which the morbid craving for stimulants may assert itself in the most intense form; and the patient will, if unable to procure ordinary stimulants, greedily consume eau-de-Cologne, spirits of sal volatile, tincture of valerian, or spirits of lavender, should such be left within her reach. And, in like manner, the pica of pregnancy may appear in an exaggerated form, when she will eat soap, or even more disgusting substances which may be at her command.

The progress and ultimate issue of such a case are matters which give cause for deep apprehension. It is not a fatal result that we dread so much as permanent insanity. The observation of Gooch on this point merits the dignity of an aphorism, when he says that "mania is more dangerous to life, melancholia to reason." When the two varieties—mania and melancholia—are considered together, it has been said that the period of convalescence ranges from a few days to two years; but, if we take the trouble to analyze the cases, and separate

the one class from the other, it will become quite obvious that the examples of protracted convalescence are, almost invariably, those in which melancholia has been the prevailing type. And, in like manner, if we avail ourselves of such statistical observations as may seem most reliable, it is equally clear that the melancholic cases afford by far the greater number of those instances in which reason has permanently succumbed. In so far as we can gather from the observations of those who have given most attention to the subject, it would seem that the existence of albumen in the urine has no such marked association with puerperal melancholia as it has with mania of the same class; but this is a point in regard to which more extended clinical study is still required.

Treatment.—From every aspect of the case, the treatment of puerperal insanity is a subject of surpassing clinical interest, and one which deserves, we venture to assume, more attention than has, in some systematic works, been accorded to it. This is particularly the case as regards prevention; for we can scarcely doubt that, when the symptoms are such as to indicate disturbance of the cerebral functions, much may be done, in the way of warding off an attack, by a judicious employment of the remedies to be hereafter mentioned. This remark applies chiefly to cases where there is a marked hereditary taint, or where the patient has been insane at previous confinements. An illustration of the latter came recently under the notice of the writer.

A delicate lady, who had married very young, became maniacal about ten days after her first, and, again, nine days after her second confinement, and on the latter occasion the convalescence had been extremely protracted, and the danger to life at one time great. Much anxiety was naturally felt by herself and her friends on the approach of a third confinement, particularly as, towards the end of the ninth month, she became hysterical, sleepless, and melancholy, as on the former occasions. A very remarkable feature in the case was the tendency to dreams of a disturbing kind, which not only rendered such sleep as she obtained unrefreshing, but made her actually dread falling asleep. The state of the tongue and dejections indicated considerable derangement of the digestive functions. As the period of expected delivery approached, the symptoms became still more marked; but they seemed to be, in some degree, under the control of the remedies which were adopted—the most effectual being chloral hydrate for the nervous symptoms, and colocynth with hyoscyamus for the bowels. Labour passed over quite favourably and in every respect satisfactorily, the patient being, however, as might have been anticipated, very feeble

and exhausted after its completion. After delivery, very strict precautions were observed to maintain perfect quietness, and freedom from any possible worry or annoyance. A certain amount of sleep was obtained by chloral: opium made matters worse. The child was not put to the breast, and the lacteal secretion was easily kept under. It was, in this case, a matter of intense interest to watch the struggle for reason; for, although at no time did she exhibit symptoms of insanity, there was not the slightest doubt that she was on the verge of it; but, happily, after a fortnight had elapsed, she rapidly improved, her appetite increased, and she enjoyed natural and refreshing sleep; until ere many more days had passed, she was pronounced convalescent. It is too much to assume that this narrative proves that an impending attack of mania was warded off; but the impression is, nevertheless, fixed on the minds of those who watched the case, that constant and anxious supervision, and, above all, skilful and judicious nursing, saved the patient from a recurrence of her malady.

The cases, however, in which preventive treatment can be expected to be of much avail, are probably of very rare occurrence; and there, no doubt, is a danger—against which we would caution the inexperienced—of looking with apprehension upon what our fears may magnify into premonitory symptoms, and thus adopting, on insufficient grounds, methods of treatment, upon the successful results of which we complacently congratulate ourselves.

Blood-letting.—The symptoms which accompany a violent attack of puerperal mania—when there is rapid pulse, heat of head, and great cerebral disturbance—are such as very readily to explain how, for so long a period, the lancet was employed as a measure of the veriest routine. Apart from the theory of phrenitis, the very violence of the symptoms seemed to demand prompt and free blood-letting. The change which public and professional opinion has undergone during the last forty years is, however, such that we scarcely think it necessary to recommend caution in regard to this once familiar remedial measure. Were it otherwise, we might point to many facts which conclusively prove that puerperal mania is essentially a disease of debility, and that, if the heat of head and other local symptoms should seem to suggest the application of leeches to the temples, even this practice must be adopted with the greatest possible caution; for cases have undoubtedly occurred, in which a very moderate loss of blood has precipitated a fatal result. In cases of actual meningitis, blood-letting is, of course, in some form or other, urgently demanded; but no real difficulty should prevent the discrimination of these very rare cases from the ordinary varieties of puerperal mania.

Regulation of Bowels.—The gastro-intestinal disturbance, which is so invariable an accompaniment of the case, requires, from the first, careful attention, and generally prompt treatment. If the bowels, therefore, are overloaded, a purgative should at once be administered; and, although we must not expect an immediate cure, as in one of Gooch's cases, we may look for some relief in the symptoms, and especially of the irritability and restlessness so characteristic of the disease. But it will not suffice simply to see that the bowels are thoroughly cleared of their contents, which are often highly offensive, for, be the case long or short in its duration, the judicious regulation of the bowels is one of the most important indications of treatment. For this purpose, aloetic purgatives are appropriate, from their derivative action. It would appear that, in some cases, signal benefit has been derived from the administration of emetics. "If the powers of the constitution are not low, and the gastric symptoms are very marked—namely, a foul tongue, an offensive breath, and a yellow eye—an emetic, not of antimony, but ipecacuanha, may be given." So wrote Gooch, and most modern writers have repeated his recommendation of emetics, at least as an exceptional method of treatment. Care must be taken, of course, not to administer those depressing agents when the face is pale, the skin cold, and the pulse quick and weak; and, indeed, the more prominently we keep before us the leading fact, that puerperal insanity is a disease of debility, the less likely will we be to have recourse to antiphlogistic remedies.

Vascular Sedatives.—Although blood-letting is, for reasons already fully explained, contra-indicated, there is often observable such a degree of vascular excitement, that we may naturally inquire whether this cannot be allayed by some safer measures. The application of cold to the head, or, what is even better, laving the forehead and temples with warm water—after which there is a refreshing feeling of coolness—may produce the desired effect. In other cases, we may administer any of the vascular sedatives, of which none, probably, will be more likely to effect the purpose we require than tartar emetic, in such doses as may be necessary to produce a depressing effect—taking great care, for obvious reasons, not to push it too far. One or two drops of the tincture of aconite, or of the tincture of veratrum viride, have been recommended by Simpson for the same purpose.

Nervous Sedatives.—Undoubtedly, the most important remedies to which we have to refer are the class of nervous sedatives. At the head of the list stands opium—the sheet-anchor, as it has been called, of the alienist physician. It is to be observed, however, that there

exists a considerable diversity of opinion as to the propriety of administering opium in the puerperal varieties of insanity. It is quite certain that in some cases it proves of no avail, while in others the result is the reverse of beneficial. Simpson, who admits this, says, "Whatever may be the way in which you give the drug, remember always, as the general rule to guide you in its administration to such patients, that it must be given in very large doses. If you expect to have any good effect from it, you must give, in general, not less than two or three grains of solid opium, or an equivalent dose of some of the cognate preparations." If unusual difficulty is encountered in the administration of the drug in the ordinary way by the mouth, the same authority recommends the introduction into the rectum of a suppository containing one or two grains of morphia; and he mentions an interesting case in which that was followed by a sleep of sixteen hours, from which the patient awakened quite free of maniacal symptoms. Dr. Tuke observes that the exhibition of opium, as well as of the other narcotics, is not beneficial when the leading symptom is acute mania; and it is well that we should bear this observation in mind, as coming from one of much experience in the treatment of all forms of insanity. In some instances, chloroform has been employed with much benefit, the patient being brought fully under the effect of the anæsthetic, a little more being given from time to time as she seems about to wake. Hyoscyamus, in combination with ether or ammonia, and Indian hemp, have also been employed with the same object. Camphor was Gooch's favourite remedy, but it is not now so frequently employed as at one time it was. Chloral hydrate is another remedy which has of late, to a great extent, superseded opium in the treatment of insanity, as in many other disorders; and experience seems to show that, in this drug, we have a most important addition to the materia medica of the class of diseases in question. The use of the warm bath should not be forgotten in an enumeration of sedative agents, and there can be no doubt that, by it, a beneficial effect is produced even when drugs have failed. Let us always remember that the primary object which we have in view, in the exhibition of this class of remedies, is to procure sleep. If we succeed in our object, the patient may at once recover; but, unfortunately, as a rule, she relapses, on awaking, into the violence and delusions of her unhappy state.

Diet.—As regards diet, unless deterred by special circumstances, such as gastric or intestinal derangement, we should at once permit the use of soups in moderation, along with other substances of easy digestion which may suggest themselves. In many cases, a small quantity of wine may be added, to be increased as the necessities of the case may

seem to require. As the case goes on, it will generally be proper to give more generous diet, and to be more liberal, it may be, in the use of stimulants; for we may be perfectly sure that, as this was a disease of debility from the first, an improved physical condition is an essential concomitant of recovery.

Seclusion and Restraint.—The general management and control of the patient involves the important points of seclusion and restraint. Our aim, in this respect, is, above all, to guard the woman from whatever may prove a source of excitement. The experience of every one clearly proves, that to permit of free association with relatives and friends is, in the highest degree, injudicious. Such interviews give rise to excited appeals as to being relieved from the irksomeness of restraint, and generally awaken in the mind painful impressions, which leave the patient for a time in a worse mental condition than before. In most cases, therefore, in which the symptoms show unusual obstinacy, it is well to separate the patient from her friends, and to leave her entirely to the management of those who have special experience in the treatment of the insane. This should, if possible, be done in her own house, for we confess to a great reluctance to send persons suffering under this comparatively curable variety of insanity to be immured in a lunatic asylum, to associate, probably, with persons whose minds are permanently deranged. We do not deny the advantage of a system of constant and intelligent supervision, but if this can be equally well secured at home, it is always well to avoid the stigma which attaches to confinement in an asylum, and which many women, after their recovery, will feel most acutely. As reason is gradually being restored, too great caution can scarcely be exercised in permitting her to renew her intercourse with her friends; and, if it should seem that interviews with them still excite her, the period of seclusion must be extended. There are cases, however, in which the visit of a relative or friend has the best possible effect, in diverting the mind from its morbid condition into channels which are more healthy, by reason of the association of ideas which recall the past. It is at this stage that change of air and scene is more particularly beneficial. During the whole course of treatment, the patient should not be left for a moment alone, and, as a prominent characteristic in such cases is suicidal impulse, it is always proper to see that nothing be left within her reach which might render self-injury possible.

Treatment of Melancholia.—The treatment of melancholia differs in some respects from what has been prescribed as proper to the maniacal variety. There will, for example, in cases which manifest this type of insanity, be no necessity for the use of any of the vascular

sedatives, as the circulation is little, if at all disturbed. From the first, therefore, we should adopt a more nutritious regimen than in the other and more frequent cases; but, unfortunately, we must look forward to a long illness and lingering convalescence, and, in some unhappy instances, to the symptoms gradually being merged in those of hopeless dementia. It will more frequently be found necessary, in the melancholic cases, to remove the patient from home, and even to place her in strict confinement.

The question of the recurrent nature of the disease is the only other point upon which we need touch; and it is one in regard to which authors do not seem to be agreed. Gooch thinks that it is unusual; but a careful observation of such meagre statistical facts as are at our command seems to point strongly to the conclusion, that there is a decided tendency to the recurrence of the disease in the subsequent pregnancies of women who have previously been the subjects of puerperal insanity. It is in cases in which there is an hereditary taint that this is most distinct, but the tendency in all cases is sufficiently marked to warrant us in taking every precaution to avoid the other exciting or predisposing causes of the disease. Tuke's cases were recurrent in the proportion of fifteen out of seventy-five.

CHAPTER XLII.

PUERPERAL ECLAMPSIA.

Relation between Eclampsia and Albuminuria.—Eclampsia from other Morbid Conditions.—Conditions peculiar to Pregnancy.—Period of Explosion.—Symptoms: Premonitory Signs; Œdema, Albuminuria, Cephalalgia, &c.—Phenomena of the Fit: Period of Tonic and Clonic Convulsions, and of Coma.—Pathology: Albuminuria: Decomposition of Urea, and Formation in the Blood of Carbonate of Ammonia: Effects of Pressure on the Renal Veins: Traube-Rosenstein Theory.—Morbid Anatomy.—Effect of Labour Pains.—Maternal and Fœtal Mortality.—Prognosis: in Eclampsia Gravidarum, Parturentium, et Puerperarum.—Treatment: Prophylaxis: Use of Acids: Purgatives and Diuretics: Induction of Premature Labour: Treatment during the Fit: Blood-letting: Chloroform: Chloral: Obstetrical Treatment at Various Stages of Labour: Acceleration: Rupture of the Membranes: Use of the Forceps.

UNDER the designation of Puerperal Eclampsia are included, not only such instances of the malady in question as are manifested during the puerperal period, but all cases, without exception, which are observed in the course of pregnancy, during labour, or after delivery. It was for this reason that we deferred any notice of Eclampsia as a complication of gestation or delivery, until, having the whole subject before us in its broadest aspect, we should be in a position to review the highly interesting speculations to which modern pathology has of late so largely contributed.

Relation to Albuminuria.—It is scarcely necessary to remark that the affection which we are now about to consider does not include all cases, without exception, in which symptoms of the convulsive or epileptiform type manifest themselves during pregnancy or childbed. It is, for example, a disorder distinct from, although, in its more conspicuous phenomena, closely analogous to, epilepsy. A very superficial examination, however, of the phenomena in question, will suffice to

show that they present certain features which, taken along with the facts which modern pathology has disclosed, fully warrant us in describing this as a special disease. Under the head of "Diseases of Pregnancy" we have already noted the frequency with which Albuminuria is observed in pregnant women, without, in the great majority of such cases, any further development of untoward symptoms. But, in a certain number, eclampsia manifests itself sooner or later, so that, in every case in which albumen is present in any quantity, the experienced practitioner has always in his mind the dread of this further and most serious complication. We need not, therefore, wonder that albuminuria had come to be looked upon by many as the *cause* of puerperal eclampsia, nor that, until recently, the theory of the disease was founded on this assumption.

Braun's theory, to which we here refer, no longer indeed holds the prominent position which it once did; but, as it has by no means been proved that it is not a possible element in the case, we give it here in his own words. "Eclampsia puerperalis," says he, "is an acute affection of the motor function of the nervous system, characterized by loss of consciousness and of sensibility, by tonic and clonic spasms, and occurs only as an accessory phenomenon of another disease, generally of Bright's disease in an acute form, which, under certain circumstances, spreading its toxæmic effects on the nutrition of the brain and the whole nervous system, produces those fearful accidents. The toxæmia (or blood-poisoning) in eclampsia gravidarum, parturentium, et puerperarum, is commonly produced by uræmia; *i.e.*, by a change of urea which is retained in the blood, or by retention of the excrementitious constituents of the urine. . . . Under the common appellation of 'Eclampsia' several pathological processes have hitherto been comprehended, which do not even present an identical series of symptoms, and which have only this in common, that there exist tonic, and especially clonic spasms, along with loss of sensibility."

Exceptional Varieties.—The exceptional varieties of eclampsia, to which the author here refers, are cases in which the origin is to be discovered in defective purification of the blood, arising from quite different causes, such as imperfect elimination of carbonic acid through the lungs, the retention of bile in the blood (*cholæmia*), or the operation, within that fluid, of certain other septic agents—the nature of which is little understood—such as are developed occasionally in the course of typhus or some other continued fever. Epilepsy, when it occurs, is to be distinguished partly by the symptoms of the attack, but, more particularly, by the absence of

albumen in the urine, both before and after the attack. Cases have been met with, in which the cause was presumed to reside in an altered condition of the blood, as regards the proportion of its various normal ingredients—such as hyperinosis, leukæmia, or hydræmia. One of the symptoms which immediately precede dissolution, in cases of hæmorrhage, is a convulsive seizure, presenting most of the features of eclampsia, and supposed by most authorities to be due to anæmia. Finally, and putting aside the cases in which convulsions are due to some diseased condition or functional disturbance of the nervous centres, there are other instances, in which an irritation of the peripheral nerves gives rise, by a reflex action, to similar symptoms, which are often associated with other hysterical manifestations, and are therefore called, with some propriety, hysterical convulsions. With rare exceptions, then, arising from those or similar causes, puerperal eclampsia may be looked upon as essentially connected with uræmic poisoning, which again is associated with, or dependent upon, an albuminous condition of the urine.

Conditions Peculiar to Pregnancy.—Before entering upon the consideration of the symptoms and pathology of this alarming disorder, it may be well to look closely, were it but for a moment, upon some of the conditions peculiar to the pregnant state. The constitutional sensitiveness, to which we have already more than once referred as eminently characteristic of pregnancy, can scarcely fail to display itself in its relation to the nervous system and its all-pervading influence. Dr. Barnes argues[1], with much ingenuity, in favour of a theory which he advances, that nature provides, against the period of parturition, a special supply of nerve-force; that this is associated with an increased irritability of the nervous centres; and that it implies a corresponding organic development of the spinal cord. This involves, we apprehend, pretty much the same idea as that which we have expressed, although it is couched in more precise and more philosophic terms. What more likely, may we not infer, than that the force of the nervous system thus surcharged may, by derangement of excited signals, be reflected upon the wrong track, and thus cause convulsive action in unlooked-for quarters, and frequently disaster as the result? But, besides this, we cannot but regard the altered condition of the blood in pregnant women, as, in some degree, predisposing to a morbid condition, one of the essential factors of which is an abnormal state of the blood itself. These changes, as formerly mentioned, consist in an increase of water

[1] See his Lumleian Lectures on the Convulsive Diseases of Women. Lancet, April, 1873.

and of fibrin, a diminution in the quantity of albumen, and a reduction in the proportion of the red, with a relative increase in the white corpuscles.

There is another point of great interest, to which Barnes directs attention in his lectures above alluded to—that all generative acts manifest an emotional and a convulsive element. "It further deserves to be noted here, that emotion takes a large part in every act or process of the generative function. In short, emotional affectability is the measure of convulsive liability. Another proposition I would state is the correlative of the preceding one. It may not be quite so obvious in its truth, but I think I shall be able to show that it is equally constant. It is this:—An energy which may be compared with, if not identical in nature with, convulsion, is an essential element in the leading acts of the generative function. I have known instances of an epileptic fit being repeatedly induced by the sexual act. I have heard of several other like cases. Voisin mentions one. La Motte knew a woman who, not pregnant, always vomited *solâ actione coitûs*."

Period of Seizure.—The period at which eclampsia most frequently develops itself, is generally stated to be during the course of labour. As, however, it is also noticed for the first time during the last weeks of pregnancy in a large number of cases, and as labour is often an immediate result of a convulsive seizure, it cannot be an easy matter to determine what is its relative frequency, with regard to the three periods of pregnancy, labour, and childbed. According to Braun and Wieger, more than half of all cases occur during labour, but, for the reason above stated, this may well be admitted as doubtful; and, for our part, we are inclined to agree with the conclusions of the writer of the able article on this subject in the "Nouveau Dictionnaire de Médecine et de Chirurgie Pratiques," that the relative frequency of the three epochs is correctly expressed in the following order—pregnancy,—labour,—after delivery. Statistics are not much to be relied upon, but it may be noticed that an average of English and Continental practice seems to yield about 1 case of eclampsia in 350 labours.

Symptoms.—Although the convulsive seizure sometimes comes on quite unexpectedly, there are probably few cases in which Premonitory Symptoms of some kind or other might not have been detected. One of the most important of the premonitory symptoms is œdema, which, indeed, is of common occurrence, especially in the ankles, feet, and labia majora. This œdema is generally developed some weeks before the appearance of the first fit, and it is occasionally, although somewhat rarely, to be observed in the upper part of the body and in the

face. Should this symptom be manifest, the suspicion of the attendant will, almost as a matter of course, be excited, with the result of an immediate examination of the urine, which may be found to yield a large quantity of albumen by the ordinary tests of heat and nitric acid. The microscope, in many of these cases, reveals the presence in the fluid of hyaline tube casts, with or without blood corpuscles; or it may indicate, by appearances familiar to the pathologist, the presence of more advanced and serious renal disorder.

In a considerable number of instances, no œdematous indication attracts attention, even although undoubted albuminuria exists; but, when this more conspicuous and familiar symptom is absent, there are other premonitory symptoms, which, in some cases, are of high importance, and, in all, demand careful attention. According to Chaussier, there are three symptoms which, as premonitory indications, deserve special attention: these are cephalalgia, derangements of vision, and epigastric pain. The headache—which is the most frequent of all—is extremely acute, and is usually complained of in the frontal region. At first it is intermittent, but, subsequently, and especially when the fit is near at hand, the pain often becomes continuous. When the sense of sight is in any way disturbed, this is justly looked upon as an indication of grave import. There is, at first, either cloudiness or dimness of vision, or that peculiar indistinctness which gives one the idea of looking through the highly-rarified atmosphere over a furnace—familiar to those who are the subjects of trifling biliary derangements. In other examples, objects seem to exhibit peculiar colours, and the vision becomes gradually more impaired, although in some instances the affection is intermittent. Very often, the loss of sight does not come on till immediately before the fit, and cases have probably been witnessed by most practitioners of experience in which a patient, either during labour or before it, complains of sudden and complete loss of vision, and in a few minutes, or it may be seconds, is overwhelmed with the most violent eclamptic seizure. The third of the premonitory symptoms of Chaussier, epigastric pain, is of less frequent occurrence than the other two. The suffering is described as being extremely severe, lasting often for hours; and, when it is of unusual severity, it is said to be an almost certain precursor of a convulsive attack. In a considerable proportion of all cases of the affection, no albumen is to be detected, and this is a fact which must be carefully borne in mind.

Phenomena of the Fit.—The convulsive seizure, characteristic of true puerperal eclampsia, varies so little, save in intensity and duration, that to have witnessed and carefully observed even a

single attack will suffice to make one familiar with its main diagnostic features. The following description of the fit is, in a great measure, borrowed from the essay already alluded to. Probably, after some of the precursory symptoms already described, the patient seems deeply absorbed and pre-occupied; then her gaze becomes fixed for a few seconds, and the fit commences immediately by rapid contractions of the muscles of the face, of the eyelids, and of the eyeballs, which seem to roll in their sockets. Those twitching movements, which give to the countenance a most painful expression, presently give place to tonic contractions of the same muscles, and of the neck. The mouth is first twisted towards the left, and the face is slowly turned towards the shoulder of the same side. The up-turned eyeballs show, through the half-closed eyelids, the inferior segment of the sclerotic. After being slowly turned to the left, the face, by a movement in the contrary direction, turns towards the right shoulder. From the head, the convulsive phenomena rapidly extend to the other parts of the body. The extensors of the trunk, thrown into violent contraction, tend to bend the spinal column backwards (*opisthotonos*). The trunk becomes perfectly rigid. The legs are equally so and generally extended. The hands close with force, the thumbs being bent inwards upon the palm, and grasped by the other fingers. Occasionally, the predominant action of the flexor muscles has the effect of fixing the different segments of the superior extremities in a semi-flexed position, so that the arm sometimes takes the attitude which is given to it to protect the head from a menaced blow. Finally, the diaphragm and the respiratory muscles become involved. Respiration is suspended, the face becomes livid, and the tongue, if projecting from the mouth at the commencement of the fit, is seized and lacerated by the spasmodic closure of the jaws, and the blood, which escapes from the wound thus produced, tinges the saliva which flows from the lips. The muscles of the larynx, and possibly those of the throat, being strongly convulsed, close these orifices. Consequently, the air, compressed by the convulsive constriction of the thorax, can only escape with great difficulty, and produces *a peculiar, interrupted, hissing expiration*. There is observed, at the same time, a complete loss of consciousness and of all sensation. The patient neither sees nor hears; and if we pinch or burn the skin, she makes no attempt to withdraw from an irritation of which she does not seem to have the slightest perception.

Clonic convulsions, affecting the whole muscular system, soon succeed the tonic variety. Jerking movements of the head, trunk, and limbs, take the place of the general rigidity of the preceding period. Frightful contortions of the countenance are the result of irregular movements

of the mouth, eyelids, and eyeballs. While respiration is being re-established in the interrupted fashion above alluded to, a frothy, and often bloody foam is forced from between the lips. The movements of the trunk and limbs consist of twitchings, so trifling in extent as merely to move the body without displacing it, so that there is not the same necessity for restraint as in some other convulsive diseases. The pulse, if strong and full at the commencement of the fit, is rapidly accelerated under the influence of the muscular and respiratory disturbance, and becomes extremely feeble towards the height of the paroxysm. It sometimes happens that the contents of the bladder and rectum are voided during the attack.

As the fit passes off, all these symptoms progressively decline. The balance of the respiratory and circulatory functions is restored; the colour of the surface becomes natural; the movements of trunk and limbs become feebler and less frequent, and finally cease. In a word, the convulsive manifestations of eclampsia may be divided into two distinct periods. The first, which is characterized by tonic convulsions, seldom lasts more than twenty or thirty seconds: the second period, that of clonic convulsions, lasts much longer—from one to five minutes, or even more. The gradual restoration of the respiratory function, during this second period, prevents any special danger to life; and it is, therefore, during the first or tonic period only, that there is immediate risk. After the fit has entirely ceased, the patient remains in a comatose condition, the depth and duration of which is in proportion to the intensity of the paroxysm, so that the patient may regain consciousness in a few minutes, or after the lapse of many hours. A dull languor, or a confused feeling, with headache, is then very generally complained of, and it may thus be some time before the patient completely recovers. This is, of course, supposing that she has but one attack, or that a considerable interval occurs between them. In extreme cases, the tonic phenomena are such in intensity and duration that the patient's life is at once sacrificed; and, in those cases in which the fits succeed each other with great rapidity, the patient has, as it were, no time to regain her consciousness, and she remains in a condition of complete coma, which is only disturbed by the recurrence of the dreaded paroxysms, and which persists until the case terminates either in recovery or death.

Pathology.—In considering the morbid conditions and the laws which regulate the abnormal muscular action in this disease, we shall confine our observations almost exclusively to the true puerperal eclampsia. We have already admitted that cholæmia, and the many varieties of toxæmia, may give rise to symptoms which are apparently

identical with those of uræmic eclampsia. In like manner, epileptic patients may, during labour, or at any subsequent stage, be attacked with convulsive seizures, which the previous history of the case, the occurrence of the "aura," and the absence of albuminuria, will usually enable us to discriminate. Hysteria, too, may simulate many of the symptoms which have been detailed, but in this case also, the absence of albumen—with a history of "globus," "clavus," or abundant urine, and an imperfect insensibility during the fits—should prevent us from falling into serious error. But to enter upon the comparative pathology of all these affections would lead us far beyond bounds, and we must, therefore, content ourselves by stating, as concisely as possible, what has been established or conjectured in regard to the ordinary variety.

That albuminuria and puerperal eclampsia are mutually dependent upon each other, or, at least, are of simultaneous occurrence in the vast majority of all cases, is an assertion not likely, in these days, to be seriously controverted. But it is by no means agreed, as to the albumen and the paroxysm, whether they stand, in any way, in the relation of cause and effect. According to Braun, and those who support his views, the albumen appears in the urine as the result of that inflammatory affection of the kidney commonly known as Bright's disease. As a result of this, the blood, as he assumes, is poisoned with excrementitial elements of the urine, and especially with urea. The experiments and researches of Frerichs, alluded to in the previous chapter, indicated however, that the presence of urea in the blood, even in considerable quantity, does not give rise to eclampsia; and the conclusion which he came to was, that the active poison is carbonate of ammonia, produced, as he supposed, by the decomposition of the urea, acted upon by some particular ferment, the nature of which has yet to be discovered by the pathological chemist. Frerichs does not admit the essentially inflammatory nature of the disease; at least he appears to do so only to a limited extent, when he assumes, in explanation of the formation of the hyaline tube-casts, that the inflammatory theory can only hold good in so far as the exudation of blood-plasma is connected with a paralytic dilatation of the capillaries. Braun, however, broadly maintains that the disease is of inflammatory origin, and that the nature of the morbid process is identical with that of Bright's disease. There are others, again, who, while admitting the existence of albumen in the urine, as an essential phenomenon, assert that this is the effect of eclampsia, and not its cause —which is, by them, supposed to be the result of some blood disease, or of some blood poison hitherto unknown to science. And perhaps the fact that, in so many instances, the convulsions precede the albuminuria, lends some confirmation to this view.

Braun has, as it seems to us, quite failed to prove his assertion that Bright's disease is *the* cause of puerperal eclampsia. He does not, indeed, deny the existence of the anæmic and other varieties already named, but he gives the latter so little prominence that one is apt to conclude from his description—what, probably, he never intended—that their importance is so little that they scarcely merit notice. No one, obviously, can take a clear and comprehensive view of the pathology of puerperal eclampsia, who does not freely admit that there are cases in which no uræmic poisoning exists. But there is another point, in regard to which Braun seems to have carried his theory too far, or, at least, in regard to which he has failed to prove his case—viz., that all cases of albuminuria are necessarily examples of true Bright's disease. Frerichs' idea on this point seems much more likely to be correct, for, if we do not misunderstand him, he appears to say that, although fibrinous exudation and albuminous urine indicate, undoubtedly, the first stage of Bright's disease, and in that case have an inflammatory origin, it by no means follows that the same symptoms cannot, by any possibility, proceed from other than inflammatory causes.

Effects of Pressure on Renal Veins.—Before the uræmic theory was advanced, it was assumed as possible that, in a large proportion of cases, albuminuria and the consequent succession of pathological changes were due to pressure on the renal veins. This has been, to a certain extent, experimentally proved; and, indeed, it seems to afford the only satisfactory explanation of the rapid disappearance of all symptoms of renal disturbance upon the delivery of the woman; an issue which we could not look for with equal confidence in any other case, unconnected with pregnancy, in which an examination of the urine gave the same chemical and microscopical results. We do not for a moment mean it to be inferred that pressure on the renal veins can account for all cases. On the contrary, it is well known that the symptoms may, although very exceptionally, be developed, either early in the pregnancy, or after delivery, when such pressure as is implied is obviously impossible. But we do think that the subsequent history of cases of puerperal eclampsia affords some ground for the supposition that the theory is worthy of more attention than Braun and Lever seem to have accorded to it. If, on the other hand, the dissections of Frankenhäuser are to be held as demonstrating a direct connection with the nerves of the uterus, we must admit it as possible—as was indeed long before conjectured by Tyler Smith—that the nervous system, and not the vascular system, may after all be the starting point of puerperal eclampsia.

It is unnecessary to detail the various fallacies which are to

be guarded against in testing for albumen, as these are now familiar to every clinical student; but in no case should the observer forget that albumen is sometimes present intermittently, and that, therefore, a negative result by the tests is not conclusive evidence of a satisfactory discharge of the renal functions. The cylindrical tube-casts are most easily distinguished, according to Braun, if we examine the fresh urine, about an hour after it has been drawn off by the catheter, withdrawing, by means of a pipette, a few drops of the fluid from the bottom of the vessel. These casts, however, he observes, may be absent in alkaline urine, as they are dissolved in the carbonate of ammonia, which is the product of decomposition of the urea. Very elaborate descriptions are given by Frerichs of the different varieties of tube-casts, but such observations belong more strictly to the pathology of a renal disease than to the explanation of a puerperal disorder.

Traube-Rosenstein Theory.—This theory has of late years found much favour in the eyes of pathologists, and has come in a great measure to supersede the assumption of Braun and Frerichs that the fits are due to the poisonous action of carbonate of ammonia on the nervous centres. It has, as has already been stated, long been admitted that one of the physiological phenomena of pregnancy is hypertrophy of the left side of the heart, and it is not disputed that this again involves an increase of arterial tension. Upon these two facts the theory to which we now refer is mainly based. There is here no question of a poison acting through the blood, but the leading idea is that the increased arterial tension acts directly on the brain. The manner in which this is supposed to operate in the production of eclampsia is, that there is, in the first place, an effusion of serum from the capillaries into the brain tissue, constituting œdema of the brain substance. The serum now acts, after its effusion, and owing to the peculiarity in the conditions of the cerebral circulation, by pressing on the outer wall of the vessels, and thus diminishing their lumen. This, again, is assumed to give rise to anæmia of the brain, which is assumed to be the actual cause of the convulsive phenomena. In regard to this theory, it is to be observed that, interesting as it is in itself, and valuable though it be as a pathological speculation, it is as yet far from being accepted as conclusively established. Among the criticisms to which it has been subjected, none is more valuable than that of the late Dr. Angus Macdonald. Dr. Macdonald carefully examined several cases in which death had occurred from puerperal convulsions associated with albuminuria. In the course of these investigations, he found that, in so far as the brain anæmia was concerned, the condition of the brain

described by Traube and Rosenstein was confirmed. He failed, however, to discover any evidence of œdema of the brain, and was thus forced to look for some other theory by which to account for the epileptiform seizures. By a process of very close reasoning, conducted in the most careful manner, as any one may see who takes the trouble to read Dr. Macdonald's paper on the subject,[1] he came to the conclusion that the probable cause of these convulsive phenomena is a poisonous action of some kind or other upon the vaso-motor centres in the medulla oblongata, the result being a spasm in the capillaries of the brain, causing the anæmia, and giving rise to the convulsions.

Morbid Anatomy.—Morbid anatomy throws no very new nor clear light upon the subject. In fatal cases, which are necessarily the most severe, we would naturally expect to find evidence—if we believe in Braun's theory—of Bright's disease, in one or other of its stages or forms; but this cannot fairly be held as indicating, with equal certainty, the pathology of those cases in which we venture to assume that the cause consists more in mechanical obstruction or peripheral irritation than in pathological lesion, and in which, presumably, a fatal result would be less likely to ensue. If the kidney is at fault, the result probably depends upon the extent to which its structure has become involved; and if, in fatal cases, the hyperæmic or exudative stage has rarely been observed, we may be sure that it is because these cases usually recover. If, on the other hand, the terminal stage, or stage of atrophy, has been reached, we cannot wonder that such irremediable disorganization should culminate in a fatal result, with or without convulsions. Besides the morbid appearances which are characteristic of lesion of the kidneys, the only observations of importance which have been made are, that the lungs are constantly œdematous and sometimes emphysematous—the result, as is assumed, of the straining of the fits. The spleen is almost always enlarged, but this should not be mentioned as characteristic of the disease in question, as it is well known that enlargement of this organ is very usual, if not invariable, during pregnancy and the puerperal state, associated, probably, with some compensatory changes in the circulation.

Effect of Labour Pains.—Some have supposed that uterine contractions have an important share in the etiology of eclampsia. That the disease may be manifested during pregnancy and after delivery, shows clearly enough that this is not an essential condition,

[1] The Bearings of Chronic Disease of the Heart upon Pregnancy, Parturition, and Childbed, &c. London: Churchill. 1878.

even although we may admit it as a possible cause. But, in truth, uterine action is much more likely to be the effect than the cause of eclampsia; for, if there be any truth in the theory—to which some prominence has been given in previous chapters of this work—that deficient aëration of the blood is a cause of uterine action, prematurely or at the full term, we can have no difficulty in admitting that this condition exists, during the paroxysm of eclampsia, in a high degree. "By exciting pains," says Braun, "and increasing their strength, fits cannot be produced at will, nor even aggravated. For we have made the observation, that, under a high degree of reflex sensibility, convulsions cannot be induced at will, at definite periods, by violent irritation of the uterus." We do not doubt this assertion, that fits cannot be produced *at will;* but there are many cases on record of fits being produced, under such a degree of reflex sensibility as is here referred to, by attempts to introduce the hand into the uterus, during labour, for the purpose of turning; or, after labour, with the view of removing the placenta; or, it may be, from emotional or other exceptional causes. This may, no doubt, be assumed to be attributable to uterine sensitiveness; but we are inclined to agree, for anatomical reasons, with Dr. Tyler Smith, that the irritation in such cases is more likely to spring from the vagina or the cervix uteri, than from the nerves which are distributed to the body and fundus of the womb. On the whole, however, we must conclude that there is a very subordinate relation between uterine pains and uræmic eclampsia.

Maternal and Fœtal Mortality.—The maternal and fœtal mortality arising from this disease are subjects of great and obvious interest, since about thirty per cent. of mothers have hitherto succumbed to its effects, direct or indirect. A mortality so large as this must necessarily awaken in the mind an earnest desire for methods of treatment more effectual than any now at our command, and there can be little doubt that, if the death-rate from this cause is in the future to be materially reduced, it must be by a careful and earnest investigation of pathological theories, and an observation, dictated by the same spirit, of clinical facts. The life of the fœtus is certainly to be looked upon, in every case of puerperal eclampsia, as in great danger. This fact being admitted, it is by no means agreed as to what is the cause upon which it depends. The stoppage of the circulation in the maternal vessels of the placenta, as suggested by Kiwisch, can hardly account for this; for, were it so, the danger would cease with the fit, whereas, the infant dies in about a half of all the cases, and almost always when the symptoms are severe and the attacks come on in rapid succession. There is reason to believe it possible that

the actual cause of death in such cases is an extension of the toxic influence from the blood of the mother to that of the child. On this point Braun observes,—"If, after numerous uræmic convulsive fits, the child is born alive, a large quantity of urea is found in the blood taken from the umbilical cord; but if it is born dead, we can, immediately after the birth, demonstrate the presence of carbonate of ammonia in the fœtal blood."

Prognosis.—It has been said that, next to rupture of the uterus, eclampsia is the most disastrous affection which it is possible for us to encounter in the practice of obstetrics. There are certain questions of prognosis, therefore, in regard to which much anxious speculation must necessarily arise. The points, as already remarked, which chiefly call for anxiety, are scanty secretion of urine, with an abundance of albumen (as when the urine solidifies on boiling), violent fits with short intervals, and profound coma: the converse of these gives good hope of recovery. The dangers, however, of eclampsia depend, in no slight degree, upon the condition of the woman, and especially upon the period, during pregnancy, labour, or childbed, at which the symptoms first manifest themselves. When eclampsia occurs during pregnancy, it is almost always in the last three months that the first attack takes place, the viability of the child being in most cases undoubted. It rarely happens in these cases—and then only when the symptoms are moderate—that pregnancy is permitted to go on to its natural term; and this alone, irrespective of toxæmic action, is apt to compromise the life of the child. In one fourth of the cases, according to Braun, the albuminuria, or rather the uræmic or ammoniacal intoxication of the blood,[1] is sufficient, without the occurrence of eclampsia, to induce premature labour; but, if the convulsive disorder should be developed, the chances of mature gestation and the life of the child are still further reduced.

When rhythmical uterine contractions, and other symptoms, have indicated the commencement of labour before the manifestation of the convulsive phenomena, the effect which is produced upon that process is necessarily watched with much anxiety. In a certain number of cases, the obvious result is an acceleration in the progress of the labour, when delivery is sometimes completed with great rapidity. "The process of labour," says Baudelocque, "in these cases, seems even more rapid than in others, as the child has often been found between the legs of the mother, although, an instant before, no disposition to delivery

[1] Hammond and others have denied that the urea in the blood decomposes into carbonate of ammonia, and this idea is, of course, quite inconsistent with the Traube-Rosenstein theory.

had been remarked." Inasmuch as no facts have hitherto been recorded which prove that the muscular system of organic life participates in the turbulent action of the muscles of animal life, it seems likely that the rapid expulsion in these instances is due rather to deficient resistance in the latter than to abnormal force of the former. It is quite possible, however, that the pains may, by a reflex action upon the nervous centres —surcharged, as Barnes supposes, by an excess of nervous force—excite the expulsive efforts to such an extent as to induce this result. But this is widely different, as will be observed, from a morbid auxiliary force arising from convulsive action. The result of delivery, in effecting a diminution in the frequency and violence of the paroxysms, is universally acknowledged, and is recognised in practice by the rule—which is admitted to be of universal application—to assist delivery as soon as the condition of the parts indicates that that stage has been reached when the passage of the child may be safely effected.

It is a matter of dispute whether the eclampsia which develops itself for the first time after delivery, is, or is not, more dangerous than the other forms. Theoretically, one would think so, seing that, uterine excitation and pressure on the renal veins being no longer in operation, the occurrence, under such circumstances, might be held as indicating a more grave constitutional affection. But Pajot, Blot, and others, have strongly deprecated this assumption, and have stated, as the result of their experience, that in these cases, the issue is, on the whole, more satisfactory. In those instances in which fits have come on before delivery, the completion of labour, although it usually produces a marked amelioration of the symptoms, by no means places the woman out of danger. It has been observed by Blot that, putting aside the danger of repeated attacks of eclampsia, there is in such cases a special tendency to post-partum hæmorrhage; and others have noticed that there remains a proclivity to the various inflammatory affections to which a parturient woman is liable, such as uterine phlebitis, peritonitis, pelvic cellulitis, and the like, the occurrence of which is obviously favoured by the derangements of the circulatory system which repeated attacks of eclampsia necessarily engender.

Treatment.—The earliest stage at which the question of treatment may offer itself for our consideration, is when the symptoms during pregnancy are such as to cause serious apprehension of an impending explosion. The most important of these are albuminuria, tube-casts in the urine, and œdema. Although a complete cure of albuminuria is very rarely obtained during pregnancy, something may, no doubt, be done in the way of moderating the disease, and preventing its passing into its higher and more incurable grades.

It is, at least, possible, by the administration of ferruginous tonics and by a liberal diet, as recommended by Cazeaux, to ameliorate a watery or otherwise deteriorated condition of the blood, and a good general effect is often produced by the use of tepid and vapour baths. In order to prevent decomposition of the urea in the blood, or to neutralize the carbonate of ammonia already formed, it was suggested by Frerichs that tartaric acid, benzoic acid, or lemon juice should be regularly given, a recommendation which, although it has not yet received the assent of some eminent physicians, must be looked upon with interest as the necessary corollary to that author's proposition as to the pathogenesis of the disease. In every case, the function of the bowels should be carefully regulated, but purgation as a prophylactic measure, although strongly recommended by some, must be resorted to with caution, as there is a risk of thereby reducing the strength, which is already enfeebled. The quantity and microscopic conditions of the urine afford the best indications as to the necessity which exists for the use of diuretics. Braun recommends that, when exudation has taken place into the Malpighian capsules and the tubuli of Bellini and Ferrein, the cylindrical clots must be removed from them, and the formation of new ones prevented. If the current of fluid proceeding from the vascular knot of the Malpighian bodies into the Malpighian capsules be strong, then the copious use of diluents is sometimes alone sufficient to wash away the cylindrical clots, and recovery ensues. But, if the secretion of urine be very scanty, and uræmic intoxication threatens to come on, then the force of the current proceeding from the Malpighian bodies must be increased, and the cylindrical clots removed, for which purpose the acids (above mentioned) and the mineral waters of Selters and Vichy are best adapted. Following the example of Frerichs, pills of tannin and extract of aloes may be used for restoring the normal tone.

Prophylasis.—It has been proposed, with the view of obviating eclampsia and its dangers, that premature labour should be induced. Tarnier recommends that this should be done before the symptoms become urgent; but we think that Braun's view is decidedly more judicious, when he insists that labour should only be provoked when the symptoms are such that the life of the woman is in danger. When the child is already dead, we are, of course, more justified in having recourse to this measure. When labour comes on, and there is reason to dread eclampsia, it has been recommended by Chailly that chloroform be employed, with the view of warding off the attack.

Treatment during the Fit.—In the treatment of eclampsia, in which the explosion has already taken place, our mode of procedure

must necessarily differ, according to the period—pregnancy, labour, or childbed—at which the fits develop themselves. But, as regards the treatment during the paroxysm, the indications are the same in all cases, and consist mainly in doing what we can so to act upon the nervous system as to moderate central irritability, and reduce peripheral or reflex excitability to a minimum. Not many years ago, all cases of eclampsia, with the exception of the anæmic and hysterical varieties, were treated upon one and the same principle—that being free general blood-letting. The facts, however, which modern pathology has disclosed have completely altered the plan of treatment. Perhaps, in some quarters, the rejection of the lancet has been too absolute. Indeed, we incline somewhat to this belief; for there are cases in which the constitution and temperament of the woman, and the violence of the attack, along with evidence of vascular tension of the brain, quite warrant us in supposing that venesection would afford the best chance of recovery. Still, it must be confessed that indiscriminate bleeding was a monstrous error, and that it would be better to do nothing at all than to bleed without selection of cases. Those who, in the present state of professional opinion, shrink most from the idea of the lancet, may, at least, in suitable cases, apply leeches freely to the temples.

Use of Anæsthetics.—A remarkable effect is produced, in many cases of puerperal eclampsia, by the administration of chloroform, ether, and other anæsthetic agents—an effect which, in some instances, quite surpasses our expectations. The approach of a repeated paroxysm, or symptoms such as make us dread the commencement of a first seizure, are a sufficient warrant to adopt this method of treatment. Respiration being much impeded, as we have seen, during the fit, it is proper at that time to withhold the chloroform, so as not in any way to interfere with the function of respiration while the aëration of the blood is already so seriously interrupted. Anæsthesia, however, often has the effect of holding in subjection the premonitory symptoms, and, so long as this result is undoubted, we may keep up the effect until the patient falls asleep, or the approach of stertor shows that the action of the drug can be safely pushed no further. When chloroform, which is the agent usually employed, fails to avert convulsions, it has very generally the effect of modifying them; and we may infer that, by its action on the muscles of the mouth, throat, and larynx, the danger of suffocation, during the period of tonic spasm, is materially diminished. And there can be no doubt, as Barker observes, that chloroform alone has considerably diminished the rate of mortality in these painful cases.

Chloral hydrate is another anæsthetic agent, which has of late been strongly recommended. The sedative and narcotic effects of this drug are well know, but it is not so generally understood that, when it is pushed further, it produces an anæsthetic effect, under the influence of which a woman may be delivered without experiencing the slightest suffering. We can, without hesitation, corroborate much of what has been advanced in regard to the marvellous effects of this drug in the treatment of convulsive diseases. When given in what we may call ordinary sedative doses—not more than thirty grains—its effect is safe, and in most cases efficacious; but, should we think of giving larger and repeated doses, we must bear in mind, that very alarming symptoms are occasionally produced by, and that death has even been the result of, what we might consider quite an ordinary dose. A number of cases have been recorded in proof of the efficacy of chloral in eclampsia. We extract the following from the Gazette des Hôpitaux of Feb. 22, 1873:—"A woman of twenty-one, pregnant for the first time, who had suffered for fifteen days from œdema of the lower limbs and of the eyelids, from headache, somnolence, great weakness and frequent calls to urinate, was admitted to the hospital of La Charité, under the care of M. Bourdon. On her admission, a large quantity of albumen was discovered in the urine. Three days passed without any appreciable change in her condition; but, on the fourth day, a violent attack of eclampsia took place, which lasted for ten minutes. During the period of resolution, an enema containing four grammes (a little more than one drachm) of chloral hydrate was administered, after which the patient almost immediately fell asleep. At the visit, on the following morning, labour had not commenced. Foreseeing the probability of a renewed attack, M. Bourdon had two injections prepared, each containing four grammes of chloral. The first was administered at ten o'clock in the morning, just as labour had commenced. The second was given two hours afterwards. At three o'clock the labour terminated, without the woman having experienced the slightest pain. On the evening of the birth, a second eclamptic attack took place. A draught containing four grammes of chloral was at once administered; she had a quiet night, and no fresh attack took place; the œdema rapidly disappeared, and the patient left the hospital fifteen days afterwards."

The effects of chloral are further illustrated in a remarkable thesis by M. Charpentier,[1] in which he contrasts the effects of the various remedial agents which, up to this time, have been employed in the treatment of eclampsia. He, more particularly, compares the effect

[1] De l'influence de divers traitements sur les accès éclamptiques. Paris, 1873.

of treatment by the old method of bleeding, and the modern plan of anæsthesia, with the following striking result, which we quote, however, with the reservation applicable to obstetrical statistics in general:

Mortality in cases treated by bleeding, ...	35 per cent.
,, ,, ,, anæsthetics, . . .	11 ,,

We must carefully avoid, moreover, the danger of adopting any particular method of treatment to the exclusion of others. If we admit that throbbing carotids, and marked suffusion of the eyes and face after the subsidence of the fits, are exceptional symptoms, warranting blood-letting, we may, in like manner, concede that ice to the head may, in similar cases, be beneficial. Dashing the face and surface with cold water during the fit, as recommended by some, is always to be avoided; for it is quite obvious that an excitation of this kind is likely to be followed by reflex convulsive phenomena. Sponging with warm water, or tepid vinegar and water, has been found useful; and opium, in some form or other, has often been freely administered, both by the mouth and by enema, in cases in which the other methods of treatment have not operated with sufficient rapidity With reference to this drug, however, experience has shown that its administration in albuminuria, in full doses, is far from being free of risk.

Obstetrical Treatment.—What may be called the obstetrical treatment of eclampsia involves a more particular reference to the stage at which the seizure occurs. The cases in which we would be justified in inducing premature labour are very exceptional; for it must be remembered that the usual effect of eclampsia is to bring on labour, so that we need not interfere in the process. Still, there certainly are cases where the gravity of the symptoms may call for prompt and decisive action.

In eclampsia occurring during labour, our mode of procedure must, of necessity, be regulated entirely by the stage of the process which has been reached. There are, however, two preliminary points which it is necessary to have in view throughout:—1st, that, on account of the extreme irritability of the nervous centres, we should avoid, as far as possible, all sources of reflex irritation, and, above all, any unnecessary manipulation or digital examination; and 2nd, that, although we recognise the importance of speedy delivery, we must be extremely careful, in adopting operative means for accelerating the process, to choose, if it be practicable, those only which are least likely to excite increased muscular action, whether of the voluntary or involuntary muscles. If the os is still closed and rigid, we content ourselves with cold applica-

tions to the head, and at the same time, by means of chloroform or chloral, attempt to allay the nervous irritability, while we await the result of the natural process of cervical dilatation. If we wish to bring on labour, the safest method of provocation is to introduce an elastic catheter, in the manner described in a previous chapter.

When the os is already partially dilated and dilatable, the treatment which is now recommended by almost all the best authorities, is to rupture the membranes, and, after thus permitting the escape of the waters, narrowly to observe the subsequent stages of the process. Forcible dilatation of the os (*accouchement forcée*) is a method of procedure which can scarcely be admitted as warrantable under any circumstances, and the same observation applies to the incision of the soft parts after the method recommended by Baudelocque. When the os is dilated, and the stage, consequently, has arrived at which the forceps may easily be applied, we hold the blades in readiness for immediate use; but, even here, if the parts are anatomically in a favourable condition, it is better to leave the case for a time to nature. When the head has passed downwards in the pelvis, and is pressing on the perineum, we need have little hesitation in using the instrument, should the condition seem urgent, or the labour begin to flag. After delivery, it is advisable that the removal of the placenta should not be long delayed, and the accoucheur should pay particular attention to the contraction of the uterus and the removal of clots.

Should the convulsions persist after delivery, or should they then come on for the first time, full doses of chloral or opium, the administration of chloroform, cold to the head, perfect rest and quiet, and the emptying of the bowels, if necessary, by a simple enema, are the main points to be attended to. When the convulsions present the character of hysteria, or are of the so-called anæmic variety, the treatment must, of course, be modified, in the one case, by the addition of the familiar antispasmodic remedies, and in the other, by the administration of stimulants with, subsequently, generous diet and tonic restoratives.

CHAPTER XLIII.

PUERPERAL FEVER AND ALLIED AFFECTIONS.

Perplexing Nature of the Subject.—PUERPERAL FEVER: *No Specific Puerperal Poison.—Should the term "Puerperal Fever" be retained?—Special Peculiarities of the Puerperal State.—Puerperal Septicæmia: Mode of Septic Poisoning.—Connection with certain Zymotic Influences; Erysipelas, Small-pox, Scarlet Fever, &c.—Cases of Inflammatory Origin.*—PUERPERAL PERITONITIS; *May exist independently of Puerperal Fever: Symptoms of an Ordinary Attack; of the more Severe form.*—ANGEIOLEUCITIS.—PUERPERAL METRITIS; *of less Frequent Occurrence: Symptoms.*—UTERINE PHLEBITIS: *Symptoms at first Obscure: Secondary Abscesses in the Later Stage: Tissues chiefly involved.*

THERE is perhaps, in the whole range of obstetrics, no subject which the writer or teacher approaches with so profound a conviction of difficulties to be encountered, as that group of affections of the puerperal period to which the term Puerperal Fever has, with a somewhat loose signification, been given. Beyond what he has learned from personal experience, he naturally turns to the literature of the subject, in the expectation that, by an analysis of the opinions expressed by the best authorities, he may succeed in formulating an intelligible nosological classification, reliable pathological data, and clear views of treatment. A very short experience will suffice to dissipate this delusion, when he will soon recognise the difficulties of his position. It must be confessed, however, that the general tendency of the most recent contributions to this department of our literature has been to clear away many of the prejudices and errors of the past. That perplexities still remain is matter which can cause us no surprise, and we may be well content if we can recognise in the views of the present day theories which are more intelligible, more consistent with personal experience, and which point significantly to a solution of many problems which have vexed successive generations of able writers and experienced practitioners.

No Specific Poison.—When we employ the term "puerperal fever" in the singular number, the expression may be held to imply a belief in what was at one time commonly maintained, that it is a specific fever which runs a definite course to a crisis, after a period of latency, and is due to what we call a specific poison, in the same sense as we have a typhous, an enteric, and a variolous poison. This puerperal poison was then assumed to be developed only in the puerperal state, and communicable only from one puerperal woman to another. The first question to be determined then is—does any such specific poison exist? or, in cognate terms—does any such disease occur as specific puerperal fever? To these questions we do not hesitate to give a negative reply; and indeed we confess to the existence of an impression that the term "puerperal fever" might be discarded, to the ultimate advantage of all concerned. The expression "post-partum fevers" has been suggested, and is in some ways to be preferred; but, in the present and still unsettled state of the subject, it would, we believe, be dangerous to abolish old familiar landmarks, and, on that account, we are content, to retain it, employing it, as it were, under protest, and in a guarded or limited sense.

Puerperal Septicæmia.—But, in rejecting the theory that there exists a specific puerperal poison, we are bound to state what views we propose to substitute for those discarded. Nothing, we think, is clearer than that writers have, under the head of puerperal fever, described a number of quite different affections; and, if we attempt arbitrarily to state what of these are, and what are not, the true fever, we will only contribute to the chaotic confusion in which the whole subject is involved. But, if we take a bolder and more comprehensive grasp of the subject, and admit that the symptoms which, for the sake of practical convenience, we call "puerperal fever" may arise from a number of different poisons or causes, and that the apparently specific character of the disease is due, not to any one specific thing in the cause, but to the peculiar physiological condition under which a puerperal woman lies—then we shall see some ray of light through the clouds. Of all the modes in which a dangerous fever may be generated in a puerperal woman, that by means of septic absorption, for which her condition at the moment offers peculiar facilities, is, we believe, decidedly the most frequent. Some go so far as to say that to these cases alone should the term puerperal fever be given. "Under the term puerperal fever," says Schroeder, "we place all such diseases of puerperal women as are caused by the absorption of septic matter, that is, organic substances in the process of decomposition." If we could accept this view without reserve, the whole subject would become simplicity itself; but, until

certain facts connected with the germ theory of disease, and the presence and diffusion of bacteria in septic matter are cleared up, it would be premature to close the question. Matthews Duncan, who agrees with Schroeder, prefers the term of puerperal pyæmia; but, whether the word employed be septicæmia, pyæmia, or ichorrhæmia, the essential points are —a wound capable of absorbing, and a poison which is there absorbed.

The idea of septic absorption by the surface from which the placenta has been removed is no new one. The theory of the present day is not, however, founded upon a mere surgical speculation, but has its basis in a series of brilliant investigations, including the demonstration of phlebitis and lymphangitis, of thrombosis and embolism by Virchow, as well as the well-known researches of Lister in regard to the action of septic poisons generally, and the influence produced by the development of bacteria. It is now known that poison introduced in this way does not generally act at the site of the placenta, but through the slight lacerations which occur in the tissues of the cervix, or through wounds which are the result of tearing of the fourchette, or fissures in any part of the vulvo-vaginal canal. The septic material may be introduced by the finger, by instruments, by infected sponges or dressings, possibly through the atmosphere; and, in a limited number of cases, where unhealthy action has taken place in the wounds, absorption takes place of decomposing maternal parts by the surrounding living tissues. Cases of puerperal pyæmia or septicæmia, therefore, may be divided into two classes, according as the mischief arises from the patient herself (*autogenetic*), or is introduced into her system from others, or, at least, from some external source (*heterogenetic*).

Influence of Erysipelas.—But, while we believe that this affords by far the most satisfactory solution of the question in regard to most cases, it seems to us equally clear that a fever, apparently identical in its symptoms and course, may arise from other poisons and other causes. Erysipelas is one of the most apparent of these, so much so, indeed, that they who believed in the existence of a specific puerperal poison surmised that the two poisons were identical, a conclusion which is not altogether inconsistent with the septicæmic theory, for the connection of erysipelas and pyæmia or septicæmia is only too familiar in the practice of surgical hospitals. The relation between outbreaks of erysipelas and the prevalence of puerperal fever has been placed beyond all dispute by the unfortunate experience acquired by the opening of Lying-in Wards in a general hospital, as the results were so disastrous that such wards are now very properly abandoned. In considering this connection of erysipelas and puerperal fever, we must not allow ourselves to be misled by the absence of redness of the skin, as it is well known that

the most malignant forms of erysipelas may fail to present this sign of the presence of the poison. Nor should we allow ourselves to doubt the reality of this connection on meeting with certain cases of erysipelas which run their course in puerperal patients, without any symptoms of special gravity.

Zymotic Influences.—Again, it is manifest that women, during the puerperal period, may be so circumstanced as to come within the range of the poison of any of the specific fevers. Take the most familiar illustration, scarlatina; and, we ask—Is this fever scarlatina pure and simple; or is it what we call puerperal fever, modified more or less by the action of the specific poison? That this is a point of special significance, was clearly indicated by an interesting debate which occupied the attention of the Obstetrical Society[1] of London some years ago; and the more recent discussion on this subject at the meeting of the British Medical Association in Dublin, in 1887, proves that the subject has lost none of its interest. In the course of the debate first referred to, the balance of opinion was in favour of the view to which we adhere—that although the scarlatina poison *may* produce in puerperal women an ordinary attack of scarlatina and nothing more, this is not the rule, but a rare exception. What we are apt to overlook, in discussing this whole subject, is the peculiar condition of the woman, no less in the condition of her blood, than in the newly organized function of lactation and uterine involution. Need we wonder then, that, when a woman so placed is attacked with scarlatina, these facts should affect the action of a special poison, and give to the disease which is engendered more or less of the features of what is called puerperal fever? It matters little in practice whether we say that it is modified scarlatina, or modified puerperal fever, so long as we recognise the affinity which subsists between the two. Various circumstances tend to disguise the presence of scarlatina in puerperal women; and, indeed, it not unfrequently happens that it is only after the patient has died that the subsequent occurrence of well-marked scarlatina in the family convinces us of its real connection with the fatal case of puerperal fever. In particular, we may have the case running its course with extraordinary rapidity and violence, without any trace of eruption, or with such trivial and transient patches of redness that we can place no reliance on their appearance; and such patches are particularly confusing in the differential diagnosis, as red eruptions seem to occur occasionally in cases of septicæmia, apart from scarlatina. In like manner, the usual soreness of the throat may be

[1] "On the relation of Puerperal Fever to the Infective Diseases and Pyæmia." Transactions of the Obstetrical Society of London. Vol. xvii., 1876.

absent, or at least quite destitute of its typical characteristics. The facts connected with infection are likewise apt to mislead us. A previous attack of scarlatina does not afford to the puerperal woman the same degree of security against its recurrence which it does to others; and the infection seems occasionally to remain latent in pregnant women for some time, so that, when the disease breaks out, immediately after labour, it may seem, from the surrounding circumstances as if any recent infection were quite impossible. This outbreak of an attack of scarlatina, coincidently with the occurrence of labour, is somewhat analogous to the "surgical scarlet fever," which sometimes appears after operations; but the very slight disturbance usual in the surgical variety, and the very alarming violence habitual to the puerperal form, may be taken as evidence of the over-ruling importance of the conditions incident to the puerperal state on which we have already so strongly insisted.

In precisely the same manner the other specific fevers may induce an affection which, whether it retains more or less of the characteristics of the disease from which it has been engendered, usually gives clear evidence of the puerperal type of febrile disease. Variola and typhus may thus take their course, but the puerperal state fearfully augments the risk; and we have lately seen an extremely painful case in which a case of undoubted enteric fever, occurring in the puerperal period, passed into a condition which it was impossible to distinguish from the more familiar septicæmic variety. The poison of measles and diphtheria may operate in the same way on puerperal women, although we may only be able to recognise the special disease by a full consideration of all the surroundings of the case.

Cases of Inflammatory Origin.—There is another class of cases, in which the earliest symptoms are clearly inflammatory. In these, the symptoms and course of the malady present, as a rule, points of contrast with puerperal fever which are very striking. Be it well understood that we do not speak now of inflammations which arise in the course of the more common variety of the fever. These we may, without hesitation, refer to the adjacent septic action. But, when the patient, by exposure to cold or imprudence of any sort, becomes affected with an inflammation which attacks the tissues of the peritoneum, the womb, or the neighbouring structures, the inflammation, thus or otherwise engendered, sometimes runs to a fatal result, giving rise the while to symptoms which, if not identical with, it would be injudicious to separate from, those of puerperal fever. Such cases, indeed, may often be regarded as milder or more chronic forms of the autogenetic variety of puerperal septicæmia.

We may thus tabulate the views here expressed :—

VARIOUS FORMS OF FEBRILE DISEASE USUALLY CLASSED UNDER THE NAME OF PUERPERAL FEVER.

1. PUERPERAL SEPTICÆMIA OR PYÆMIA : including
   - *a.* (*Autogenetic*). Cases arising from the infection of the patient by the absorption of *her own* secretions through abrasions, wounds, &c. ; by the retention of clots or portions of placenta in the uterus ; or by the absorption of products resulting from inflammatory disease.
   - *b.* (*Heterogenetic*). Cases arising from the infection of the patient *from without*, chiefly from other cases of septicæmia, directly or indirectly.
2. PUERPERAL ERYSIPELAS : Often present in epidemics of so-called puerperal fever, and communicated from one patient to another ; also communicated at times to puerperal women from ordinary forms of erysipelas.
3. PUERPERAL FORMS OF SCARLATINA AND OTHER SPECIFIC INFECTIOUS FEVERS, the distinctive forms of the special diseases being often masked, and the illnesses usually characterized by great virulence and intensity.

Under the designation of "Allied Affections," it is well that we should consider at this place those local inflammatory affections, which, although in their simple form not entitled to rank as fevers, are, as we have said, apt to run into a peculiar and fatal febrile condition. In their simple form, or early stage, we prefer to call them "post-partum inflammations."

Peritonitis—Puerperal Peritonitis.—This, as one of the most frequent inflammatory sequelæ of delivery, and the most familiar accompaniment or complication of puerperal fever, is the affection which naturally is the first to attract our attention. Inflammation of the peritoneum may, as we have said, exist and run its course without any manifestation of symptoms indicating the operation of a morbid poison : in other words, puerperal peritonitis may exist as an affection distinct from puerperal fever. In some cases, it affects a small portion only of the membrane in the pelvic region, when it may give rise to a more chronic affection (Pelvi-peritonitis), which will fall to be considered in a subsequent chapter.

An ordinary attack of peritonitis almost always comes on within a week of the period of delivery. The patient is seized with a rigor, of greater or less severity, followed by heat of skin, acceleration of the pulse, and other febrile symptoms. At the same time, she complains of pain in one spot—usually in the pelvic region—whence, if violent in degree and unchecked, it may pass over the whole of the abdomen. Imprudence during the period of convalescence may no doubt lead to the development of simple peritonitis, but this is less frequently the case than we might have anticipated. The sooner after labour the symptoms are manifested, the more serious is our prognosis as to the

issue of the case; and, in a large proportion of cases, if not checked by appropriate treatment, it is apt to run rapidly to a fatal termination. That portion of the abdomen which is the seat of the inflammation has often been observed to be swollen and tumid. The pulse is quick, wiry, and incompressible, and rises in frequency as the inflammation extends; the tongue is usually not much altered in the early stage. Nausea and vomiting are of frequent occurrence as the disease progresses, and the swelling and tumefaction of the belly become more marked. The bowels are obstinately costive, and, in the more advanced stages, the patient lies on her back with her knees drawn up.

To this, if the symptoms are unchecked, succeeds a second stage, which it is sometimes impossible to distinguish from puerperal fever. There is now a decided change in the character, from the inflammatory to the asthenic type. There is a marked alteration in the countenance, a pitiful appearance of ghastly distress. The belly swells still further and becomes tense, with great aggravation of the suffering, so that the patient can now no longer bear even the pressure of the bedclothes. If the lochial discharge has not been previously arrested, it now becomes fetid, and the breasts become flaccid. The tongue is dry and often furred, and the unhappy patient suffers from excessive thirst. The violence of the vomiting in some degree subsides, but the patient is now attacked with diarrhœa, which is often violent and uncontrollable. The extremities become cold, the surface of the body is bedewed with a clammy perspiration, and low muttering delirium sets in. With these symptoms, or even at an earlier period, there is a remission or cessation of the pain, which sometimes gives rise to fallacious hopes in the mind of the patient and her friends. Hiccough, picking of the bedclothes, and delirium are the immediate precursors of death. Occasionally, a rapid metastasis of the inflammation takes place, even after an abatement of the symptoms has led us to hope that the danger had passed. The inflammatory process may thus blaze out afresh and with equal violence—in the pleura, for example—and we have known a metastasis take place, first to one pleura, and subsequently to the other. Such facts point to the close resemblance of this phase of the disease to septicæmia.

Nor is it of any great moment to determine where the one variety ends and the other begins. If we admit the fact, that puerperal fever may be generated from various sources, may we not assume it as probable—to say the least—that it may be developed in the course of an inflammatory disorder, which is so frequently its accompaniment?

But peritonitis occurs likewise as a complication of nearly all forms of puerperal fever. The symptoms are, from their earliest development, of a violent, if not of a malignant type; the pulse is, from the first, extremely rapid and thready, about 140 in the minute, and destitute of any force. Instead of there being constipation—which is the prevailing characteristic of simple peritonitis—diarrhœa sets in early, and the case, thus passing over, as it were, the initiatory stages of the disorder, plunges the patient at once into a state from which recovery may seem to be all but hopeless. The form is of a low type from the first, and the abdominal tumefaction commences at an earlier stage. It has also been remarked that, in this variety the pain begins in the region of the diaphragm, and radiates from that point, instead of from the pelvic region, over the whole peritoneal surface—and that with much greater rapidity than in the other form. The absence of excessive tenderness, which we expect in peritonitis, is often very complete, and the inexperienced may thus be misled in the diagnosis. It would appear, also, that, in the more serious form, there is a remarkable difference in the exudative effects of the inflammatory action. In ordinary peritonitis, adhesive lymph is poured out, as an attempt at reparation on the part of nature, barring the further progress of the malady by gluing the parts together. But, in the more serious and fatal form, which has most likely its origin in contagion, the lymph is not adhesive, the inflammation is not circumscribed, and both Hulme and Leake found that, in these cases, the peritoneum is softened to such an extent that it actually seems gangrenous.

Puerperal Metritis.—This is an affection which, uncomplicated, is of much less frequent occurrence than peritonitis. Hysteritis, or Metritis, under the ordinary childbed conditions, involves the idea of an acute inflammation, attacking tissues which are the seat of a very peculiar process of involution, one of the physiological phenomena of gestation. In a chronic form, it is by no means of unfrequent occurrence; but, under such circumstances, the result is not usually fatal. In the acute form, however, it has been observed to be very fatal, and to terminate, as in the case of peritonitis, with all the horrors, apparently, of puerperal fever. In the mode of access, it does not differ materially in its symptoms from peritonitis. The pain, however, is, in this case referred more particularly to the hypogastric region, where the uterus may be distinguished of larger size, and sometimes harder, than is usual at the period. On a digital examination by the vagina, the nature of the case is further revealed by the heat and tenderness of the os uteri. This has been more frequently observed as a consequence of severe or protracted labour than the peritoneal variety; and, in those

cases in which a fatal result has ensued, extensive disorganization of the uterine tissues has been remarked.

Uterine Phlebitis.—That an inflammatory affection, having its seat in the tissue proper of the uterus, may occur in childbed, we cannot dispute. But it may well be doubted whether many of the cases which have been referred to this category ought not rather to have been classed under the above designation.

To no one do we owe more, as regards the elucidation of this subject, and a painstaking investigation of the principal phenomena upon which it depends, than to Dr. Robert Lee. Opinions are, however, on this matter, far from harmonious. It is easy to conceive that, when the structure of the uterus is the seat of inflammatory action, it can be no simple matter to determine, during life, what share the various tissues of the organ take in the morbid phenomena upon which the symptoms depend. If the evidence is not altogether clear, many facts combine to show that there are, in a considerable number of cases of puerperal fever, indications of great significance, which it is difficult to explain on any other hypothesis. The earlier symptoms may, indeed, admit of a different interpretation. At first there is more or less of rigor, followed by pyrexia, and accompanied with pain in the hypogastric region, generally referred more particularly to the iliac or ischiadic region of one side. The condition of the lochial and mammary secretions varies, although the general tendency is to the arrestment of both. These symptoms are usually developed within three or four days after delivery: diarrhœa—and not, as in the case of peritonitis, constipation—is a prominent feature in the case. A tympanitic condition of the abdomen is also uniformly observed, but the general tenderness, and other symptoms of peritonitis, are, for the most part, absent. The pulse is generally over 120, sometimes reaches 150, and is quite soft and compressible from the first. Should resolution take place at this stage, it would, we believe, be impossible to say whether it has been a case of metritis, of phlebitis, of circumscribed peritonitis, or of any of these combined.

Secondary Abscesses.—If the case goes on, however—and, some times, in the worst form, very shortly after the seizure—a new class of symptoms is developed, which alone can be held as pathognomonic of phlebitis, and of the blood poisoning which has probably been the result of traumatic septicæmia. The patient now complains of pain in various parts of the body—most frequently in the neighbourhood of the joints. In these situations, swellings and erysipelatous blushes appear, indicating the formation of secondary abscesses; or the abscesses may form internally, either in the neighbourhood of the uterus, or in distant organs—

such as the lungs, liver, or kidneys—and occasionally they are embedded deeply in the substance of the muscles. In some cases, the eye has been the seat of violent destructive inflammation. Such formations of pus, if neither violent nor extensive, may, in some fortunate instances, be looked upon as critical, and in that sense favourable; but, unfortunately, experience points to a contrary result. In the worst cases, which have been observed in various epidemics, the tendency of the inflammatory process to attack the joints has been uniformly well marked, and the fearfully rapid nature of the action, the enormous quantity of pus which is formed, and the destruction of the articular cartilages, have, only too frequently, been demonstrated in post-mortem examinations.

Puerperal phlebitis may extend to the proper tissue of the uterus, and also to the peritoneum—in which latter case the symptoms of peritoneal inflammation are superadded to those which more vaguely indicate inflammation of the uterine veins. It would appear that, in a certain number of fatal cases, the action is confined to the uterus, a result which may easily be explained by supposing that death had taken place before the toxæmia had time to produce its distal effects, in the production of abscess, &c.

Angeioleucitis.—Another variety of puerperal inflammation is that form of the process in which it has its seat in the Uterine Lymphatics. This was first described in France by M. Dance, and has, since that time, attracted the attention, both in this country and abroad, of most systematic writers. The presence of pus within the vessels of the lymphatic system has been repeatedly demonstrated; but, in so far as the symptoms are concerned, it would seem to be impossible to distinguish the affection from some others which have been described, and especially from uterine phlebitis. But, besides this, it is extremely improbable that, in the condition of the uterus at the puerperal period, angeioleucitis should be present, without involving, more or less, the other tissues. And, perhaps, the converse may equally hold good—that inflammation originating in other tissues may very readily pass to the lymphatic system. Although attempts have been made to show that the worst results of puerperal fever spring from inflammation of the lymphatics, Virchow has proved that lymphatic thrombosis is a favourable symptom, in so far as it bars the transport of infected material.

The various affections above detailed by no means embrace all the complications which may exist along with puerperal fever, whether in the relation to it of cause or of effect. And if we were to attempt an analysis of what may be called anomalous cases, we would but complicate still further a subject which we are specially anxious to put in as

simple a light as possible. Some have placed phlegmasia dolens in this category, and in the cases in which that affection has been observed along with puerperal fever, it may well be supposed that both are the result of the same poison. It is quite obvious, however, that puerperal fever cannot be considered as a result of phlegmasia dolens; otherwise, the latter affection would be looked upon with much apprehension, instead of involving, as it does, a favourable prognosis. The general state of the system in childbed, to which we have already so frequently referred, is singularly favourable to an extension of inflammatory action which has already been commenced. It need scarcely, therefore, cost us a moment of surprise, when we find the local inflammations of the puerperal state blazing out with a violence which defies extinction, and rapidly assuming the asthenic or adynamic features, which are held to be characteristic of the most fatal form of puerperal fever.

CHAPTER XLIV.

PUERPERAL FEVER, &c.—(CONTINUED.)

Question of Contagion: Septicæmic Infection: Other Specific Poisons.—Contagion from Inflammatory Cases.—History of Epidemics.—Symptoms of Puerperal Fever.—Morbid Anatomy: Pathological Appearances no Indication of the Virulence of the Attack.—Treatment: All Varieties to be treated as if Contagious: Treatment by Blood-letting and Purging: Gooch's Treatment: Copland's Treatment: Turpentine, Blisters, and External Applications; Tonic Treatment: Antipyretics: Stimulants.—Prophylactic Treatment: Cleanliness: Use of Antiseptics.

BEFORE going further in our attempt to describe the symptoms and treatment of the fevers of the puerperal state, it is proper that the subject of contagion should receive that careful attention which its important practical bearing demands. For purposes of convenience, we may divide the question of contagion into two parts—1st, Is puerperal fever contagious?—and, 2nd, Are the "allied affections" contagious, and, if so, to what extent? Some confusion may here arise as to the meaning of the word Contagion. "By a contagious disease," says Schroeder, "is meant one in which a specific poison is produced within a diseased organism, and which, transferred to other individuals, always produces the same specific disease, such as measles, scarlatina, small-pox, syphilis, &c." It will at once be noticed that if we concede that puerperal fever is not due to a specific poison, and at the same time admit the accuracy of Schroeder's definition of the word, we necessarily come to the conclusion that puerperal fever is not a contagious disease. Such hair-splitting in regard to the meaning of words tends more frequently to confusion than to precision, and preferring, as we do, the word "contagious" to "communicable," we employ the former in its broader and more colloquial signification.

In reply, then, to the first part of the question, we hesitate not for a

moment to say that puerperal fever is contagious. According to Barker, there have been described, since 1740, upwards of two hundred epidemics of puerperal fever, and it would perhaps be sufficient, in most minds, to establish the truth of our proposition, carefully to peruse the details of one or two of these outbreaks, when the facts will be seen to be utterly irreconcilable with any other theory. Many observations, in themselves conclusive, are on record. "Two medical men," says Dr. Tyler Smith, "brothers and partners, attended in the space of five months, twenty cases of midwifery. Of these, fourteen were affected with puerperal fever—a fatal result ensuing in eight cases. The only other known death from puerperal fever in the same town, within the period named, occurred in the case of a patient attended by a medical man who had assisted at the *post-mortem* of one of these puerperal patients. After this disastrous period, the two brothers relinquished all their midwifery engagements for one month, in which time five of their cases were attended by other practitioners, and no instance of fever occurred in the course of that month. They then returned, and several fatal cases again happened. . . . Mr. Roberton of Manchester relates, perhaps, one of the most cogent instances of contagion and fatality on record. In the space of one calendar month, a certain midwife attended twenty cases belonging to a lying-in charity: of these, sixteen had puerperal fever, and all died. The other midwives of the same charity, working in the same district, attended, in the same time, 380 cases, none of whom were affected with puerperal fever. In another large town, containing many thousands of inhabitants, and numerous medical men, fifty-three cases of puerperal fever occurred. Of these, no less than forty happened in the practice of one medical man and his assistant."

If these facts do not suffice to establish beyond all question the doctrine of contagion, we would refer the reader to the works of Gooch, Routh, and Semelweiss, for evidence which appears to us to be unanswerable. Those who oppose the contagious view, attempt to account for such facts as have been quoted, by exaggerating the importance of epidemic influences. That epidemic and atmospheric influences bear upon the question we do not dispute; but, that these will enable us to account for such cases as have been mentioned, we cannot for a moment believe. The well-known occurrence of sporadic cases has also been urged against the doctrine of contagion. It is, however, so easy to account for such cases, by the septicæmic theory, that we may pass this subject by without further comment. There are other influences which may well be assumed to have some share in the manifestation of the disease—such as the general health, temperament

and constitutional vigour of the patient, and the circumstances under which she is confined. It has been repeatedly noticed that depressing mental emotions exercise a very marked effect, so that women who have been seduced are more prone to the disease than others. "Several of the worst cases I have seen," observes Dr. Churchill, "were mainly attributed to this cause."

The doctrine of contagion is, in regard to septicæmic puerperal fever, now universally received; but, in regard to some of the varieties, and the allied inflammatory affections, the question presents itself for solution under conditions of greater difficulty. We have already expressed our opinion that, although scarlatina may run its course in a woman who has been recently delivered, without the development of any marked symptoms beyond those of the specific fever, such cases very frequently pass into a condition which is identical with puerperal fever. But, beyond this, we are convinced that, from the contagion thus developed, puerperal fever may be again and again reproduced; and, if we are right in this, the same remark will apply to the other specific fevers.

One or two examples, illustrative of the manner in which puerperal fever is generated by different poisons, may here be adduced. A patient was admitted, by some oversight, into the wards of the Dublin Lying-in Hospital, while labouring under typhus fever; but, the error having been discovered, she was removed in a few hours. In the beds on the right hand and the left of this woman were two lying-in women; both were attacked with puerperal fever, and both died. "In another case," says Dr. Tyler Smith, "a medical man was in constant attendance upon a patient suffering from gangrenous erysipelas, and, between the 8th of January and the 22nd of March, attended the labours of ten women: all had puerperal fever, and eight of the patients died. This was in a town of moderate size, and no other patients in the place were known to have had puerperal fever. A remarkable instance to the same effect, is related by Dr. Ingleby. Two practitioners attended a *post-mortem*, where the patient died from this disease. The first was summoned, in one direction, to a midwifery patient, who was attacked with puerperal fever; the other attended two cases in succession, both of whom were seized with the same disease." The enormous mortality which at one time prevailed in the Lying-in Hospital in Vienna, gave rise to the belief that the disease was propagated by means of poison communicated by students who had recently been engaged in dissection, and the observations of Dr. Semelweiss strongly corroborated the supposition. It seems to us, however, that this has been considerably exaggerated as a means of generation of the poison, as the evidence upon which the

assumption rests is derived mainly, though not entirely, from lying-in hospitals. Medical students are proverbially careless in these matters, unless they are under strict supervision; but it is somewhat strange that observation, extended over many years of the practice of a large lying-in charity, where the women were delivered by students and midwives exclusively at their own homes, has failed, in our own experience, and in that of others, in recognising any such marked septic influence as Semelweiss would have us anticipate. That the cadaveric poison has, undoubtedly, caused puerperal fever, is, however, quite enough to demand from every one the strictest precautions which can be devised, in order to avert so dreadful a calamity. With regard to post-mortem examinations, the danger is probably very much increased by the nature of the disease which has caused the death, puerperal fever and peritonitis, erysipelas, and the specific fevers being apparently more dangerous than other forms of disease.

Contagion from Inflammatory Cases.—In regard to the cases which may be supposed to be of inflammatory origin, the case is different. A simple inflammation is not communicable; but, when a case, at first simple, runs a rapid course and ends fatally, with the symptoms, let us suppose, of peritonitis and metritis combined, he would be a bold man who would venture to assert that there was no danger. We have never seen any reason to doubt that such a disease is communicable, and we have never been able to discover any *essential* difference between it and the other varieties. There is a general impression, however, that the autogenetic cases, and those which run a milder and more chronic course, are less apt to give rise to contagion than the others. For the practitioner, the only safe rule is to look upon all cases with suspicion, and to adopt the most stringent and careful precautions in every serious inflammatory case, lest he should become the means of carrying death to his patients.

History of Epidemics.—Puerperal fevers have been met with under different forms, and, as we might anticipate, the intensity or concentration of the poison is attended with a corresponding virulence in the symptoms. But, besides that, it would seem that, in particular outbreaks of the disease, the cases resemble each other in manifesting certain complications, chiefly inflammatory. But, instead of attempting to classify the different forms by talking of Malignant Fever, Hidrotid Fever, and the like, we prefer to make the attempt to treat the whole matter in a more comprehensive and simple manner. The older writers describe this affection as "childbed fever." The term "puerperal fever" dates from the beginning of last century.

About 1746, a dreadful epidemic of puerperal fever appeared in Paris,

a very accurate and full description of which was given by Malouin.[1] The mortality was so frightful, that at the Hôtel Dieu scarcely a single patient recovered. "The disease usually commenced with diarrhœa; the uterus became dry, hard, and painful: it was swollen, and the lochial discharge was irregular. The women then experienced pain in the bowels, particularly in the situation of the broad ligaments; the abdomen was tense; and to these symptoms was added headache, and sometimes cough. On the third or fourth day after delivery, the mammæ became flaccid. On opening the bodies, curdled milk (*sic*) was found on the surface of the intestines, and a milky, serous fluid in the peritoneum. A similar fluid was found in the thorax of certain women; and when the lungs were divided, they discharged a milky or putrid lymph."

During the latter half of the eighteenth century, violent epidemics appear to have occurred in most of the principal towns of Europe, and, of these, the history and details have, in many instances, been preserved. The lying-in hospitals of Vienna, Paris, Lyons, and London, were all in turn attacked, with results, as regards maternal mortality, too dreadful to contemplate. In the great hospital at Vienna, for example, the death-rate has reached as high as one in six of all the women admitted. It would appear, further, that the disease when once established in a locality, showed a tendency to return; and, with regard to Paris, Tenon observes, that "it has come to prevail more and more, and to be, as it were, naturalized." We must not suppose, however, that the mortality from this cause was only observable in the statistics of lying-in hospitals, for the disease spread by contagion, as well as by epidemic influences, through all classes of society; and there can, we presume, be little doubt that the mortality was enormously increased by the obstinate incredulity of those who refused to admit that the disease was contagious. Still, it has always been upon lying-in hospitals that the great weight of mortality has fallen; and, although improvements in construction, and the greater attention which is now paid to ventilation, cleanliness, and disinfection have enormously reduced the hospital death rate, there is no doubt that much yet requires to be accomplished before perfection is attained.

The statistics of the London, Dublin, Edinburgh, and Aberdeen hospitals all show that, wherever observed, the disease was a very fatal one; but, if we examine into the details given of previous epidemics, we cannot fail to be struck with the fact that there has been a great variety in their nature. When we find a history of an epidemic, in which the mortality has been comparatively trifling, and

[1] Mémoires de l'Académie des Sciences. 1746.

blood-letting has obviously been attended with a beneficial result, we may well doubt whether this should be called puerperal fever. But, putting aside for the moment such doubtful epidemics, we find that, when the asthenic type of the disease is perfectly marked from the outset, the local lesions vary at different times; and we thus observe that, in some epidemics, the peritoneumis chiefly involved, while, in others, the affection of the joints and other distant parts, may be held to indicate the presence of uterine phlebitis as the special characteristic of the prevailing epidemic. Another fact, which stands out very prominently in the history of epidemics, is the marked variation in the intensity of the disease, or the virulence of the poison, so that, in one case, we have a low percentage of deaths, while, in another, the patients are, as it were, struck dead by a fever which runs its course in a few hours.

Symptoms.—It is a fact beyond all question, that the disease we are now considering has attained its maximum of intensity in hospital epidemics. It usually originates in the course of the second, third, or fourth day, although sometimes later, and cases have been recorded in which it has come on before delivery. It is often ushered in by a rigor, but this is far from being invariable; and, indeed, it may be remarked that the violence of the rigor is, in this case, much less marked than in some instances where the impending disorder is comparatively trivial. The patient is conscious, from the first, of a feeling of great depression, which is often accompanied with headache and uneasiness at the præcordial region. There has often been observed, even thus early, a haggard, anxious expression of countenance, as if she were in dread of an impending calamity. The pulse is feeble, or at least compressible, and is seldom less than 130, rising in many cases to 150 and upwards. Extreme rapidity is a very bad sign, especially if associated with a high temperature. There may sometimes be a rigor and a hot stage, quickly followed by free perspiration, which, supposing it to be critical, we may look upon as a favourable augury; but, as the case goes on, we soon observe that the discharge from the skin brings no relief to the symptoms: it continues profuse to the end, and a peculiar odour has sometimes been observed. Those instances in which the perspiration constitutes a peculiar feature of the case are not common, but were considered of sufficient importance by Blundell, to warrant him in describing a distinct variety of puerperal fever, which he, from the leading symptom, called "Hidrosis," or "Hidrotid Fever."

Generally speaking, however, the skin is hot and dry, although towards the termination of a fatal case it becomes cold, damp, and

clammy. The effect produced on the milk and lochia is variable; and there are even cases in which these discharges are more than usually abundant. Vomiting is by no means an uncommon symptom, but it does not generally come on very early, while the matter ejected is sometimes dark in colour, like coffee-grounds, and occasionally very offensive. Diarrhœa is, as we have already seen, an almost invariable symptom in the later stages of those inflammatory affections which pass into puerperal fever; but, in cases of the ordinary type, diarrhœa frequently comes on at a much earlier stage, when the offensive nature of the evacuations often indicates still further the extent to which the digestive functions are involved. The tongue presents at first no distinctive character, but, as the case rapidly advances, the deep fur—white or brownish, moist or dry—is a further index of the extent to which the normal functions are disturbed. Marked delirium is not usual, but there is often observed an excited condition in which the patient exhibits a peculiar tendency to loquacity, amounting, it may be, to slight delirium on awaking from sleep.

In a very large proportion of cases, the peritoneum, or uterus, or both, are involved. Thus, one of the earliest symptoms, after the disease has been thoroughly established, is abdominal pain, which either originates in the hypogastric region, or, more exceptionally, in the epigastrium. The pain is excessively acute, so that the patient will frequently complain of the weight of the bed-clothes; and it is soon accompanied with more or less swelling or tumefaction—the enlargement being due, in the first instance, to flatulent distension, and, subsequently, to fluid effusion which is poured into the cavity of the abdomen. In some cases, the pain is associated with enlargement of the uterus, which may be recognised through the abdominal walls. This has sometimes given rise to the idea, when the general symptoms were not carefully observed, that the pain was simply due to those irregular contractions of the organ which are commonly known as after-pains.

As the abdominal distension increases, which often happens with extreme rapidity, the sufferings of the patient are proportionally augmented. She now lies on her back, breathing rapidly, sometimes with her knees drawn up, and exhibiting on her countenance that appearance of ghastly distress which is so painful to witness. The surface and extremities become cold; the mechanical impediments to perfect respiration give something of lividity to the countenance; and the symptoms, becoming otherwise more grave, indicate that the period has been reached when hope may be well-nigh abandoned. At this period, the abdominal pain, tenderness, and tension often diminish, and, but for

the ominous pulse and countenance, we might fancy that the patient was better. The diarrhœa continues, the motions being passed in bed; vomiting occurs, without any retching, of a dark or greenish matter; and the patient may now breathe with greater ease. The pulse is undiminished in frequency, but it is otherwise changed for the worse, as is indicated by its thready or imperceptible character. The intellect generally remains clear to the end; but, in some cases, low muttering delirium, subsultus tendinum, and other similar symptoms, come on before death ensues.

Such symptoms are, as will be observed, almost identical with those which have been described as characteristic of the fatal inflammatory affections previously mentioned. If we attempt to follow the description and classification of various authors, we find that the varieties and divisions of puerperal fever are infinite, and are, were we disposed still further to classify, susceptible of more elaborate subdivision still. For our present purpose, however, it may suffice to observe, that, although we believe the symptoms above detailed to be among the more important of those which arise in the course of an ordinary septicæmic case, other varieties may exhibit themselves, in the experience of any man, which may differ in important particulars.

Morbid Anatomy.—The various forms under which puerperal fever may manifest itself involve, almost necessarily, a corresponding variety in the appearances produced in the different tissues which may be implicated. In the case of the post-partum inflammatory affections which, after a somewhat longer course, apparently pass into puerperal septicæmia, and thence to a fatal result, the appearances of an ordinary local inflammation are, as we might confidently anticipate, more distinctly revealed. In peritonitis, for example, the more closely the case resembles, in its symptoms and progress, the purely local disease, the more closely do the morbid consequences correspond. When the septic infection is concentrated or malignant, as in hospital epidemics, the fatal result ensues with such rapidity that there are really no marked post-mortem appearances. In ordinary cases, however, the lesions are conspicuous. In many cases there may be observed in the vulva, vagina, or cervix, or at the site of the placenta, an ulcerative action at the margin of the existing wound. This is called the "puerperal ulcer," and the neighbouring parts will be found to have participated more or less in the unhealthy action. Inflammation, softening, and even sloughing or gangrene of the mucous membrane of the womb, is often noted, the extent of the changes corresponding, in some degree, to the virulence of the morbid action. The pelvic connective tissue is very generally the seat of a diffuse inflammatory œdema, to the development of which the

relaxed condition of the parts gives mechanical encouragement. The inflammatory process has also been traced to the lymphatics, the veins, and the parenchyma of the uterus, and, in a large proportion of the fatal cases, the inflammation will be found to have spread to the peritoneum, and from that again, by mere continuity of tissue, to structures more remote.

In some cases there is found clear pathological evidence of inflammatory action in distant organs, which cannot have been transmitted thither by continuity. These appearances will generally be found to have reference to symptoms manifested during life, and constitute what is usually called metastasis. A new interest has been given to this subject by the discoveries of Virchow and his followers in regard to thrombosis and embolism, and we can have little hesitation in admitting the possibility of a fragment of an infected and disintegrated thrombus being conveyed by the circulation to a point in the arterial system, where, being arrested, it becomes a fresh centre for violent inflammation. Billroth and Waldeyer refer all circumscribed metastatic inflammation to embolism, but, in the present state of our knowledge, this is certainly going too far, although we may admit that this theory gives us by far the most satisfactory explanation of the phenomena of metastatic inflammation in these cases, and, more particularly, of the formation of purulent deposits in distant organs.

In regard to these distant abscesses, it may here be remarked that they have most frequently been found associated with the malignant or epidemic variety of the disease, of which we have many descriptions, chiefly from hospital experience. On this point, Boivin and Dugès observe that "pus is sometimes found even in the substance of the womb, and generally nearer to its exterior than its interior surface. Thus, pus collects into distinct abscesses, from one to five inches in diameter—sometimes into a simple or multi-locular deposit, with a greenish or viscous appearance; at other times it is infiltrated into the fleshy fibres, imparting to them a reddish-yellow colour, perceptible through the peritoneum. In this latter case, tumours form—which are sometimes hard and projecting—upon the fundus uteri; at other times they are flattened, soft, and broad. These latter come further down towards the lateral regions, and often form a continuation, together with purulent infiltration between the laminæ of the broad ligaments, with the cellular tissue of the pelvis and the substance of the ovarian ligaments." This has reference to certain secondary purulent formations which we shall have occasion to notice in our next chapter. There is here also, as in the peritoneal form when rapidly fatal, a tendency to turbid effusion into the serous cavities.

The most interesting, however, of all the points upon which pathological anatomy may be expected to throw light, are those which are connected with uterine phlebitis—an affection which has, as we have seen, been supposed, by eminent modern writers on the subject, to bear the most intimate relation to true puerperal fever. The primary and essential morbid change in this variety is inferred from the condition in which the ovarian and uterine veins, and their branches within the uterus, have been found. We do not doubt that here, as in phlegmasia dolens, erroneous inferences have been drawn from a mere discoloration of the lining membrane of the vein, associated with the presence of a clot; but many of the appearances which have frequently been observed and described, are so unequivocal, that the existence of true phlebitis must be conceded. Of this nature are thickening, contraction, and absorption of the tissues of the vein, and the presence of lymph and pus as obvious products of local inflammatory action. Certainly, in some cases, and probably in many, this inflammation of the veins is associated with softening of the muscular tissue, or some other sign equally significant of metritis.

In the less severe cases, it will probably be found that the inflammatory process has not extended further than the veins of the uterus itself, or the veins which directly communicate with it; but, in some instances, evidence of inflammation is said to have been traced as high as the renal veins, or even the vena cava itself, although there is reason to believe that, in these latter examples, the mere presence of pus in the vein has sometimes been admitted as evidence of inflammation of its structure.

The presence of pus within the veins, in the region of the uterus, is to be accounted for chiefly by the changes which take place in the blood-clot, which is the more immediate result of phlebitis. Coagulation is, as we have seen, equally the result of pyæmic action; but we are here considering it as the effect of, or, at all events, as associated with, true inflammation of the veins. From the disintegration and decomposition of the blood-clot, pus is evolved, and becomes the cause of some of the more characteristic of the morbid appearances of uterine phlebitis. The circulating medium is poisoned with pus, the result of which may be immediate septic coagulation; or, the poison being carried, by detached portions of the thrombus or otherwise, to distant localities, it there produces the secondary phenomena which are disclosed after death. In a large proportion of these cases, swellings are observed in the neighbourhood of the joints, which, on being freely incised, give exit to pus. In the worst cases, pus is found within the joint itself, and the ligaments and cartilaginous surfaces afford proof of

a rapidly-destructive inflammation. If the eye has been affected, evidence will there be found of inflammation of equal violence, although limited in extent. Abscess may also be found in the muscles or cellular tissue of the limbs, while in other cases, what has been supposed to be an abscess has turned out, on examination, to be an effusion of sero-sanguineous fluid. The brain is rarely affected; but, within the cavity of the chest, clear evidence has often been observed of that metastasis of inflammation to which allusion has already been made, sometimes within the lungs—which have been found condensed, of a dull red colour, and infiltrated with purulent matter—while, at other times, the violence of the disease seems to have expended itself mainly on the pleura. The heart is often enlarged and softened; and, within the pericardium, lymph and serum may, with the usual alterations in the membrane itself, afford conclusive proof that inflammation has been present here also. The various portions of the intestinal canal, from the stomach to the rectum, have, in exceptional instances, been found to have been severely affected, usually by a simple extension of the inflammatory process from the contiguous position of the peritoneum. Ulceration and perforation of the stomach have been noted in some of those cases. The spleen and liver have also been found to be extensively disorganized, and their tissues the seat of single or multiple abscesses. In the greater number of the cases which were examined by Dr. Hulme, he found the omentum inflamed, and frequently black and gangrenous. In no small proportion of fatal cases, the kidneys have been found to present evidence of similar disorganization, obviously the result of violent inflammation: generally speaking, one kidney only is affected.

The pathological appearances are no reliable indication of the virulence of the attack, as has also been frequently observed in the case of other febrile diseases which prove rapidly fatal. As a rule, however, in very severe cases, the extent of the local lesions is commensurate with the severity of the attack; and, although we may meet with cases ultimately fatal, in which the metro-peritoneal symptoms are moderate in degree, a careful examination will usually disclose irrefragable evidence of violent local inflammation. While, therefore, the appearances are often such as to indicate a degree of malignancy and rapid action, which can only be explained on the hypothesis of puerperal fever, we are aware of no mode of disclosure by which morbid anatomy can reveal to us, with even an approach to certainty, how we may distinguish between the various types of the disease. The post-mortem appearances in the sporadic variety are certainly much less formidable than in the epidemic form; and, indeed, it is evident that the descrip-

tion, both of symptoms and of morbid appearances, which we read in many admirable works, is founded almost entirely upon an experience of hospital epidemics; whereas it should be clearly understood that the disease in sporadic cases, or even when communicated by contagion in private practice, is, as a rule, much less serious in its results than the once dreadful, and still formidable scourge of lying-in hospitals.

Treatment.—The treatment of puerperal fever varies according to the class to which each case belongs. Nothing can well be imagined more absurd, and nothing, in fact, has been more disastrous in its results, than to manage all cases of puerperal fever upon one and the same principle. One feature, indeed, is common to nearly all the cases, and consists in the contagious nature of the disease. This is the leading idea which, more than anything else, we would again impress upon the student with all the emphasis at our command. Whether the case be one of peritonitis, metritis, or puerperal fever in the ordinary meaning of the term, the risk of contagion must always be borne in mind; and, although we must admit that the danger is much less in, for example, simple peritonitis, we can never be sure that it is absent, and therefore we should deal with every case, without exception, as if its contagious nature were already demonstrated.

Blood-letting.—A further reference to the history of various epidemics shows, with remarkable clearness, that methods of treatment which have been found useful at one time have proved the reverse of beneficial at another. Dr. Gordon, who, in 1789, when the disease appeared in Aberdeen, saw a large number of cases, wrote, several years afterwards, a most excellent treatise on the subject, in which he drew attention, with much force of argument and illustration, to a new and successful method of practice, by means of the bold and early use of the lancet—taking twenty or twenty-four ounces at once, and, if necessary, ten more soon afterwards. "When I took away," he says, "only ten or twelve ounces of blood from my patient, *she always died;* but, when I had the courage to take away twenty or twenty-four ounces at one bleeding, in the beginning of the disease (*i.e.*, within six or eight hours after the attack) *the patient never failed to recover.* After the bleeding, it was my practice to bring on a diarrhœa, which, when excited, I found necessary to continue through the whole course of the disease, till it was entirely conquered." Nothing, we would say, were we reading of a new and unknown disease, can be more simple than this; nothing more clear than the indications of practice. In an epidemic which occurred in Leeds early in the present century, the

treatment of Dr. Gordon was energetically adopted by Mr. Hey; and although, prior to this, every case that had come within his knowledge died, no sooner did he purge his patients and bleed them early, to the extent of thirty, forty, and even fifty ounces, than they recovered, in the proportion of thirty cases out of thirty-three. Such facts, which were further corroborated by Armstrong, Mackintosh, and others, were held to be so significant, that for many years the treatment of epidemic and contagious puerperal diseases was, simply, heroic blood-letting.

Gooch's Treatment.—About 1829, a remarkable essay was published by Gooch on what he terms "The Peritoneal Fevers of Lying-in Women," which effectually staggered the belief of those who had clung most persistently to the bold measures of Gordon. It would seem that, before this, doubt, founded upon unsuccessful results in treatment, had sprung up in the minds of many; but, till Gooch wrote, no one had had the courage to controvert ideas so generally entertained. One of the first points to which he calls his readers' attention, and which he states with great force, is the marked distinction which subsists between various epidemics, and the result of their treatment at the hands of different observers, who imagined that they were all treating the same disease. He makes it quite obvious that the disease of which William Hunter says, "of those attacked by this disease, treat them in what manner you will, at least three out of four will die," cannot be, in all respects, the same as Dr. Butter treated in Derbyshire, "with ten grains of rhubarb and ten grains of cordial confection every day," without a single fatal result. Nor can it be possible that the fatal scourge of the London and Paris hospitals can be the same as that observed by Richter of Gottingen, of which he observes, "I have often seen the childbed fever, and always treated it successfully." Gooch began his practice with a decided prejudice in favour of blood-letting, and his results seem to have been so far satisfactory, when he saw the patients early; but, when several days had been allowed to elapse, the issue was almost uniformly fatal. As his experience increased, he fully recognised the fact, that a blind and slavish adherence to the lancet sometimes inflicted irreparable injury upon the patient.

Copland's Treatment.—In 1823, Dr. Copland was appointed consulting physician to Queen Charlotte's Hospital, and the result of his experience is given by Dr. Ferguson. "The disease was malignant, and often ran its fatal course in twenty-four hours from the first appearance of the symptoms. . . The treatment ultimately adopted by Dr. Copland for this malady was boldly stimulant. Immediately upon the appearance of the symptoms, a bolus containing from eight to

sixteen grains of camphor, from ten to twenty grains of calomel, and from one to three of opium was given, and repeated in four, five, or six hours. The dose of camphor was very rarely less, and but seldom above that named, and the interval between the two doses sometimes only three hours, but never longer than six hours. The dose of opium in the second and subsequent boluses was regulated according to the effect of the first. Soon after the second bolus was administered, about half an ounce of spirits of turpentine and an equal quantity of castor oil was given, on the surface of some aromatic water; and, if this did not operate fully on the bowels within three hours, the same medicines in double and treble quantity were administered in enemata. The bolus just mentioned was still continued at the same intervals, or after five or six hours from the exhibition of the second or preceding one. Very soon afterwards, and generally subsequent to the administration of the turpentine draught and enema, a large piece of flannel, folded several times, and sufficient thus to cover the whole abdomen, was directed to be wrung as dry as possible out of very hot water, to be instantly freely sprinkled with spirits of turpentine, and applied over the abdomen, to be closely covered by wash leather or a dry cloth, and to be kept thus applied for some time, or renewed until erubescence of the surface of the abdomen was produced. The success of the above treatment in the malignant form I found to be almost complete, for *scarcely a case terminated fatally* in which it was early resorted to."

It is quite clear that the stimulating treatment detailed in the above extract, and which was attended with results so satisfactory, must have been directed against a fever of a different type from that which was encountered by Gordon and Hey. The more, indeed, do we study the history of puerperal fever, the more prominently does it appear, either that some of the diseases described were not puerperal fever, or that the type of the disease has varied much during the last hundred years. We shall not here enter upon the question, whether or not there has been, as some have alleged, a general change in the type of all diseases from the sthenic to the asthenic form; but, admitting the force of many facts which have been advanced in support of this assertion, we confess to having entertained all along a strong impression that the idea has led to an all but invariable discontinuance of general blood-letting as a feature of modern practice, is an exaggeration, and, as such, to some extent, an error.

All this leads directly to the practical conclusion that, although the nature of the treatment to be adopted should depend upon the type under which the disorder presents itself, and also upon the stage at which the case is brought under the notice of the physician, that type is,

in the experience of all modern practitioners, clearly asthenic. There is no single plan of treatment applicable alike to all cases. Indiscriminate blood-letting is sure to lead to disaster, and invariable stimulation is not free from risk. It is the first duty, therefore, of the judicious practitioner to determine the nature of the individual case, and the special treatment proper to it. The cases to which blood-letting is most applicable are undoubtedly those in which the earliest symptoms indicate acute inflammation of the peritoneum, of the uterus, or, more probably still, of both. When a patient, therefore, of robust constitution, complains, after a rigor, of acute hypogastric pain, which is accompanied by a rapid, incompressible pulse, throbbing temples, and suffused countenance, we should not hesitate to apply from ten to twenty leeches over the surface of the abdomen. Few persons nowadays would be bold enough to bleed from the arm, but it by no means follows that there are no cases in which this would not be the more judicious treatment. If the thing is to be done at all, it must be done boldly, and, above all, it must be done early; for, if the patient has passed the acute stage, to bleed her is probably to hasten her doom. It is to be remembered, however, that cases do occur in which the symptoms are such as to baffle even the most experienced observer; and, in such instances, it has been suggested that the bleeding should be more tentative in its nature, the effect of the flow being carefully noted, and only continued if the pulse and other indications show that it is being well borne.

It does not, in the least, matter what names we give to those acute affections upon which blood-letting has been found to produce so decidedly beneficial an effect. For all practical purposes, it is sufficient carefully to distinguish between them and the purely septic cases, in which blood-letting is inadvisable, unless inflammation should arise as a complication, and at an early stage. A rapid compressible pulse, distended abdomen, diarrhœa, and the characteristic appearance in the countenance of ghastly distress, are among the more important of the signs which indicate that depletion must not be ventured upon.

The same simple rule must be our guide as to the administration of purgatives. Free purgation is generally proper, in the cases to which venesection is applicable; and it is well know that, in simple peritonitis, constipation is an almost invariable symptom. Our object is to eliminate the septic material through the channel of the alimentary canal. The extent to which purgation is to be carried, and the class of medicine to be selected, must be determined, in each case, according to the judgment of the medical attendant; but it may be well for

him to remember that, in some fatal cases, the morbid appearances have been such as to suggest the probability of an irritant action from violent drastics having had some share in the result. It is better, therefore, when the bowels do not respond to a sufficient dose, rather to supplement that by an enema, than to run the risk of further irritation. In the later stages of the ordinary disease, or in the malignant variety, strong purgatives are contra-indicated, not only because diarrhœa is a common symptom towards the end, but because there is no hope of a beneficial derivative action from the bowels. To such a case, the milder laxatives, or enemata containing turpentine, are appropriate.

In the worst forms of the disease, and especially in hospital epidemics, the power of medicine and the skill of the practitioner are alike set at defiance; but, however desperate the symptoms, and apparently hopeless the prognosis, we must persevere so long as life lasts. Between simple puerperal peritonitis and the malignant fever—which is as deadly as the plague—infinite varieties may be observed; but the management of all will be more successful if we proceed upon general principles, rather than minute and special distinctions. We shall, therefore, content ourselves by mentioning, in addition to the means already detailed, the various remedies which have been found most useful by experienced and able practitioners.

Turpentine.—Spirits of turpentine has been very highly recommended in the treatment of puerperal fever, and in doses of one drachm, as recommended by Copeman,[1] we have seen striking and satisfactory results. Flatulent distension of the bowels is, moreover, so frequent a complication, that we would naturally anticipate some benefit from this drug, although, perhaps, in this sense, it would be more correctly described as a palliative. In point of fact, there is nothing of the nature of a specific remedy which we are warranted in recommending with any confidence, but it is proper that attention should be called to the sulphites and sulphurous acid, both of which have been strongly supported by some recent German writers; and it is well to remember that, if the sulphites are freely employed, a purgative action, which we are desirous, on other grounds, of producing, will be induced. The cold water treatment, which has so undoubted an effect in reducing temperature, has received the support of Schroeder, but it is more than doubtful whether we would be justified in anticipating from this any more reliable effects than from the specific remedies hitherto suggested.

Blisters.—Blisters to the adbomen have been thoroughly tried, but without any very satisfactory results. Among modern authorities, Dr.

[1] Records of Obstetric Consultative Practice. London, 1856.

Churchill seems, however, to have retained some belief in their efficacy, and says that, from the cases he has seen, he is "inclined to think blistering useful, and it affords an opportunity of applying mercurial ointment to a highly-absorbent surface." Iodine has also been suggested, but the external applications which find most favour are either warm poultices or turpentine fomentations.

Tonic Treatment.—The asthenic character which has been so generally observed in the more recent epidemics has led many, whose experience has been confined to cases of this type, to discard all treatment in favour of a stimulant and tonic regimen from the first. Dr. John Clarke gave bark in powder and decoction, with opium and wine. M. Beau found great benefit in the use of quinine in doses of fifteen to thirty grains in the day. Certainly, the results of free stimulation have been such as to warrant us in persevering, while life lingers, in the use of this, which is perhaps the most valuable agent at our command.

It has lately been proved by Sir Spencer Wells that, after ovariotomy, benefit is derived by boldly tapping and withdrawing large quantities of turbid serum, in cases in which extreme effusion had come on in connection with other symptoms of septicæmia. It remains to be determined by the experience of the future, whether, by puncture from the vagina or in the abdominal walls, the withdrawal of similar effusions may, in puerperal fever, be attended with equally favourable results.

Antipyretics.—This class of remedies is strongly indicated, and undoubtedly useful, in many cases. Quinine is one of the most important and reliable of this class, more so, perhaps, than any other. Should it fail, however, to produce the desired effect, we may try salicylate of soda, digitalis, veratrum viride, antipyrin, or antifebrin, all of which have been found more or less useful. It is quite clear that if we succeed, by any of them, in reducing and keeping down the temperature, a great point is gained.

Stimulants.—No method of treatment is more valuable than this. They are in the first place powerful antipyretics, and we have often seen them produce a marked diminution of temperature when the drugs above enumerated have failed. And, in the later stages, direct stimulation tends to sustain the waning powers, while the process of elimination of the septic material is being effected by nature.

Prophylactic Treatment.—The question of prophylactic treatment, which naturally suggests itself here, is second in importance to no point relative to our subject. The rules of lying-in institutions are generally framed with the view of prohibiting students who are engaged in the dissecting-room from the practice of midwifery, or, at least, point

to the strictest precautions being observed. The danger, however, is much greater from those who are engaged as dressers in hospitals where there is erysipelas or hospital gangrene, or from those who have been engaged in post-mortem examinations of dangerous cases of this class. Improved ventilation has proved in hospitals an invaluable check on the ravages of the epidemic disease; and there is good reason to believe that in some instances neglect of proper drainage had led to an aggravation of the type. The case of the General Lying-in Hospital, which was built on the marshy land by the Thames, affords an illustration of this, as, after proper drainage, the mortality in that institution diminished in the most remarkable manner. Where there is the slightest reason to suspect the possibility of any zymotic influence, bichloride of mercury, Condy's fluid, or carbolic acid, should be freely employed, as there cannot be the slightest doubt that these agents tend to neutralize this or any other morbid poison.

It is impossible to exaggerate the importance, in its bearing upon prophylaxis, of the strictest attention to cleanliness on the part of the practitioner, who in an ordinary case should wash his hands not only after but before each examination. Such a precaution would no doubt be scrupulously observed had he just come from a case of scarlatina or erysipelas, or from a post-mortem examination; but the more completely the doctrine of septic infection is established, the more clearly does it appear that the great majority of cases of puerperal fever are preventible, and, if so, we may be sure that to act, in every case, as if we had special reason to fear that we might propagate the disease, is the surest way to reduce the risks to a minimum. For ordinary practice, thorough cleansing with hot water and soap will suffice, and the nail brush should also be used, as below and at the root of the nails are the situations in which septic matters are most likely to be retained. The precautions necessary, where we have any special cause for alarm, consist in a still stricter attention to cleansing the hands, and here, in addition to soap and water, some disinfectant should be employed. We must not, however, lose sight of the fact that the finger of the accoucheur is not the only possible conductor of the poison. Unless the nurse directly imports the poison, the fact of her attention being confined to one case at a time renders her less likely to infect a patient than a general practitioner, who, in the course of a single day, supposing his obstetric practice to be quite free from fever, may have visited several cases of scarlatina, dressed a wounded limb affected with phlegmonous erysipelas, and performed a post-mortem examination. But, on the other hand, the nurse in the course of her special duties comes directly in contact with the discharges, so that there is no point of greater im-

portance in the education of these women than the necessity of inculcating strict cleanliness in their own persons as well as in that of their patient. A weak solution of carbolic acid may be habitually employed. Again, the poison may very readily be conveyed by the dress, so that it should be changed where we have previously been in attendance upon a suspicious case. And, in like manner, the linen, napkins, syringes, catheters, and so forth, are possible vehicles of conveyance; but this, for obvious reasons, is more likely to take place in hospital than in private practice.

The topical treatment of the most probable centres of septic infection must never be lost sight of. It is to be feared that the dread which attaches to this disease renders practitioners sometimes culpably timid in regard to the manipulation of the genital organs, and so duties are left absolutely to the nurse, which ought at least to have our careful supervision. If, in any case, fœtor or any other abnormal symptom should arise in connection with the discharges, antiseptic injections are indicated; and, if necessary, carbolic dressings should be applied to the lacerations, and even weak solutions of carbolic acid injected into the uterus by the double canula, more particularly in those cases in which there is reason to suspect that clots, or shreds of the placenta or membrane, have been retained within the womb. These means, with the strictest attention to cleanliness, will go far to check or modify the progress of the disease.

It has frequently happened that no cleansing, or disinfection, or change of dress, has had any effect in checking a series of fatal cases in the practice of the same person, so that no alternative remains but to withdraw absolutely from practice for six weeks or more. Does this not show that there are other modes of communication? If we are right in supposing that transmission, even of a septic poison, is possible through the medium of the atmosphere, may we not assume that, in cases of great virulence or concentration of the poison, the system of the accoucheur may become impregnated with the poison, and that, although harmless to him, it may again be given off by the lungs or by the skin. It is true that disease germs have never been seen or traced through the air; but practice founded on this belief has, in the hands of Lister and his pupils, been attended with brilliant results. Of late years, the striking diminution of the mortality in lying-in hospitals is beyond all doubt due to the rigour with which cleanliness and prophylaxis in all its details is enjoined and practised. This, indeed, warrants us in entertaining the hope that the days of hospital epidemics and their frightful results are gone for ever.

CHAPTER XLV.

PELVI-PERITONITIS: SUDDEN DEATH IN PUERPERAL PERIOD: ANÆSTHESIA.

PELVI-PERITONITIS.—*Nomenclature.—Inflammation of the Uterine Appendages.—"Fulness," "Hardness," and "Tumour."—Pelvic Cellulitis: Anatomy of the Pelvic Cellular Tissue.—Bernutz on Pelvi-peritonitis.—Diagnosis of Pelvic Cellulitis and Pelvi-peritonitis.—Formation of Abscess.—Treatment: Alleviation of Pain: Application of Leeches, Poultices, Fomentations, &c.: Methods of Promoting Absorption; Mercury; Iodine; Counter-Irritation: The Operative Treatment of Abscess.—Peri-uterine Hæmatocele.*—SUDDEN DEATH IN PUERPERAL PERIOD:—*Embolism: Entrance of Air into Veins.*—ANÆSTHESIA: *Various Anæsthetic Agents: Effects of Chloroform on the Progress of Labour: Disadvantages of Chloroform: Modern Practice.*

IN addition to the diseases which have been grouped together in the two preceding chapters, under the common designation of puerperal fever, there are other affections, chronic for the most part in their nature, which require some notice at our hands. These are by no means necessarily associated with the puerperal state, although about a half of all cases have their origin in inflammatory processes which arise, more or less distinctly, from the condition under which women remain for a certain period after delivery. The connection between the disorders which we are about to describe and puerperal fever is, in some cases, direct and unmistakable; but, in the great majority of instances, the disease, although inflammatory in its nature, has no such intimate relation to puerperal fever as to admit of its being placed in the same category. For these and other reasons, it is thought better to consider the group of affections to which we have referred as separate from, although associated with, those previously described.

Nomenclature.—In most systematic works, even in those whose merit is universally recognised, these affections are dismissed with a

brief notice, and under a great variety of names. The first difficulty, therefore, which we encounter, is in the matter of nomenclature—*Pelvi-peritonitis, pelvic cellulitis, sub-peritoneal inflammation, peri-uterine phlegmon, perimetritis, parametritis,* and *inflammation of the uterine appendages,* are only a few of the many designations under which this group of affections have been described. They may be most usefully considered together, for purposes of analysis and such description as is here possible. A very brief preliminary definition of the various terms above employed is, however, essential.

What was originally described by M. Nonat as *peri-uterine phlegmon,* is better known to English readers under the more familiar designation of *pelvic cellulitis,* with which we may assume it to be almost synonymous. The idea involved is an inflammatory affection, tending to the formation of abscess, which has its seat in the cellular tissue between the uterus and peritoneum, or in some other part of the same tissue within the pelvis. Both expressions are unfortunate and involve a fundamental error. *Sub-peritoneal inflammation* is another synonym equally objectionable. That *inflammation of the uterine appendages* is very commonly associated with the class of affections which we shall describe is universally admitted; but, if used as a comprehensive designation, as Churchill has employed it, it may be supposed—and if so, very erroneously—to be confined to those tissues.

Dr. Matthews Duncan, who has treated the subject in his well-known work at considerable length, and with his usual ability, adopts the words *parametritis* and *perimetritis,* borrowing the idea of this nomenclature, as he tells us, from Virchow, who, taking example from the heart and other organs, proposes to use *peri* to signify inflammation of serous membrane, and *para* to imply inflammation of cellular or connective tissue. "Perimetritis, then," he adds, "will strictly imply inflammation of the uterine peritoneum. Parametritis will imply inflammation of the cellular tissue in connection with the uterus. Similar terms may be found for the Fallopian tubes, *perisalpingitis* and *parasalpingitis,* and likewise for the ovaries. But I shall seldom have occasion to resort to them. In the present imperfect state of our diagnostic resources, it would be mere pedantry to do so frequently. There are only a few cases in which we can assert, during life at least, that the pelvic peritonitis is perisalpingitis, or perioophoritis, or that the pelvic cellulitis is parametritis, parasalpingitis, or paraoophoritis. To hide our ignorance, on this point, it would be convenient if we had a rough word expressing the internal genital organs, to which to prefix the adverbs 'peri' and 'para.' But we have not such a word, and I shall therefore, in accordance with old custom, give the uterus the precedence, and use

terms compounded of it, as perimetritis, parametritis, &c., without always implying, by such use, a meaning exclusively and properly uterine, but implicating also the tubes and ovaries. I shall, indeed, use the words *perimetric inflammation* and *perimetritis, parametric inflammation* and *parametritis,* with a still wider meaning, implying inflammations which directly owe their origin to disease or injury of the uterus, tubes, or ovaries. For example, a lumbar abscess, or an iliac abscess, may be perimetric or parametric in origin, although lumbar or iliac in mere situation."

Pelvi-peritonitis, again, is the name to which a preference is given by Bernutz, and which is used by him in a sense precisely similar to that which Dr. Duncan has attached to his term "Perimetritis." There is very little in a mere name after all; but if we were to select the one which is least likely to lead to misapprehension, we would be inclined to select pelvi-peritonitis, as indicating a limited peritoneal inflammation, involving that portion of the membrane which invests the uterus, or other generative organs, and often causing adhesive matting together of various parts, and the formation of tumours which may be discovered both from the brim of the pelvis, and from the vagina.

From the results which have been disclosed by post-mortem examinations, it is certain that the uterine appendages are not unfrequently the seat of inflammation, varying in degree and in extent; the action, in some instances, being confined to the peritoneal coat, and, in others, extending more deeply, so as to involve the entire thickness of the Fallopian tube on the side affected. If the ovary is the seat of the disease, the result may, in like manner, be displayed, either on the surface of the organ, or—should the action have reached more deeply, or have originated there—the stroma may be found extensively disorganized, and occupied with abscesses varying in size. Such serious disorganization may at any time result from an extension of the destructive inflammation so characteristic of puerperal peritonitis; but, in the cases now under consideration, the symptoms are generally more chronic from the first, and are often looked upon, in reference to other co-existing phenomena, as merely secondary. It can be no easy matter, therefore, to determine where the disease has had its origin. The symptoms of inflammation of the uterine appendages are almost always very obscure. When the pain is circumscribed by limited peritoneal inflammation, its site in the iliac fossa, or lateral region of the hypogaster, may be held to indicate a probability that the structures in question are affected; but there are no reliable means for determining whether the morbid action is limited to the peritoneum and subjacent

tissue, or extends further, so as to involve the deep-seated structures of the tube or ovary.

"Fulness," "Hardness," and "Tumour."—The diagnosis of these affections depends, in a great measure, upon the results of abdominal palpation and vaginal examination; and, from the many fallacies which may spring in the course of such an investigation, it may be added, that upon the special experience of the examiner the accuracy of any opinion which may be formed will mainly depend. Dr. Matthews Duncan directs attention, at considerable length, and with much propriety, to the loose manner in which the expressions, "fulness," "hardness," and "tumour," are employed in the narratives which we read of such cases; and it is quite clear, although the words themselves are sufficiently explicit and significant, that much confusion arises from this source, especially, perhaps, in confounding tumour with mere hardness. The same remark applies to any investigation which may be made from the vagina, and it is, in every case, of the highest importance that we should determine if any connection exists between an enlargement observable from above and one which is made out from below. In the case of a solid tumour, free from serious adhesions, this is very readily recognised by such method of investigation—the impulse communicated from one direction being readily transmitted to the other. If it be a cyst or abscess, fluctuation is thus sometimes distinguished, without any difficulty, between the two hands, which are simultaneously employed in the examination. But, in the case of mere diffused fulness, or hardness, or a tumour which is bound down by adhesions, the difficulty of diagnosis is increased, to an extent which is only fully recognised by those who have devoted most attention to such matters.

Pelvic Cellulitis.—Pelvic cellulitis, peri-uterine phlegmon, or parametritis—accepting those expressions as synonymous—indicates, as already stated, an inflammation of the sub-peritoneal cellular tissue, possibly radiating thence, and always involving a tendency to the formation of abscess. Until within a comparatively recent period, every mysterious tumour or enlargement following delivery, was, without much hesitation, referred to this category. Recent investigation seems, however, to assign to it a much less important position. To no one is modern science more indebted, in reference to this subject, than to Bernutz; but there can be little doubt that that experienced and able observer undertook to prove too much, when he thrust aside pelvic cellulitis—merely admitting the possibility of its existence—to make room for his own idea of pelvi-peritonitis. It is a dangerous thing to prove too much, inasmuch as anything approaching

to exaggeration is apt to attach discredit, even to investigations which are otherwise of the highest importance. But, freed from this blemish, no impartial critic can deny that M. Bernutz has rendered to this particular department of science the most eminent service, in boldly exposing the fallacies which attach to the familiar idea of pelvic cellulitis.

The "slightest dissection," says the writer referred to, "shows that the cellular tissue subjacent to the peritoneum is so thin and scanty that it is impossible to separate the serous from the uterine tissue, and that, consequently, it cannot be the seat of swellings which, according to M. Nonat's observations, attain, in the space of a few hours, to the size of a hen's egg. The only other possible position for the so-called ante- and retro-uterine phlegmons is the small band of cellular tissue situate at the junction of the neck with the body of the uterus, and this we can hardly credit, unless it be proved by an undoubted *post-mortem* examination, which has never yet been adduced. In the absence, then, of direct proof, I may be allowed to doubt the existence of this affection as described by M. Nonat. I have for four years asked for proof of this proposition, and, as no one has yet been able to give it, I shall assert that the swellings we are now considering, are certainly not formed by the inflammation of the thin ring of cellular tissue which encircles the upper portion of the neck of the uterus. In the exceptional cases, where this tissue is involved in the inflammation of the surrounding parts, it but very slightly augments the peri-uterine swelling, and this only when there exists also pelvi-peritonitis." It is not here denied, as will be observed, that inflammation of the sub-peritoneal cellular tissue occurs: it is merely pointed out that anatomical research strongly discredits the idea that inflammation is likely to be propagated directly from the uterus to the cellular tissue. It would appear that the only situation at which the cellular tissue subjacent to the peritoneum has any appreciable thickness, is where it joins the broad ligaments—a situation at which all authorities admit of the probability of pelvic cellulitis; and even Bernutz himself confesses that phlegmons of the broad ligaments are justly so called, but he points out, at the same time, as an inference from various elaborate dissections by MM. Jarjavay and Lefort, that the disposition of the various aponeurotic lamellæ almost necessarily directs such purulent formations as may ensue towards the abdominal walls, or else to the deep iliac fossa.

Aran and Bernutz make a broad but unfortunate distinction between iliac abscesses and those which are now under consideration. The history of an ordinary iliac abscess is no doubt very different; but, if

we are to admit that the sub-peritoneal tissue and the internal genital organs are the site of inflammation, it is surely no great stretch of the imagination to believe that an abscess which is the result of this may make its way into the iliac fossa, so that, while originating within the true pelvis, the bulk of the resulting tumour is actually abdominal rather than pelvic.

What we owe chiefly to Bernutz, is the clear demonstration of the fact, that a large proportion of so-called cases of pelvic cellulitis are not so at all, but that the symptoms are due to circumscribed inflammation of the pelvic peritoneum. This pelvi-peritonitis is, as we have said, identical with the perimetritis of Matthews Duncan. "I conclude," says Bernutz, "that inflammation of the pelvic serous membrane is always symptomatic, and that it is generally symptomatic of inflammation of the ovaries or Fallopian tubes. Thus great interest attaches to the study of this affection; and it is very important thoroughly to understand the symptoms, in order to describe satisfactorily the uterine, and more especially the tubo-ovarian diseases which occasion it." By pelvi-peritonitis, then, we understand an affection which is essentially a secondary or symptomatic one—the inflammation originating, according to Bernutz, in the uterus, tubes, or ovaries, and extending thence to their peritoneal investment. It is difficult to understand how the disease can spread in this manner without involving the intermediate cellular tissue, but the difficulty is very simply solved by Bernutz, by the denial that any such tissue exists over the uterus, except at the site already alluded to between the layers of the broad ligament. That this is the case we very much doubt, and, although it may be extremely thin, all analogy would lead us confidently to expect that a trace at least of cellular tissue must there be discoverable. That the peritoneal affection in these cases is secondary to inflammation of the subjacent organs is a fact which, in regard at least to the majority of cases, he has succeeded in establishing; but we do not think that he is warranted in assuming that pelvi-peritonitis can be produced in no other way. In some cases, the result has been the formation of cysts in the peritoneum, which are circumscribed by the inflammatory process, and may contain a purulent or muco-purulent fluid. In others, the tumour —the nature of which during life it had been impossible to determine— was discovered, on post-mortem examination, to consist of a mass of viscera matted together by adhesions, usually involving the tube and ovary with contiguous portions of the bowels. The diagnosis of this latter class of tumours is particularly difficult, as the structure of the mass is such as to render almost useless the valuable information which we obtain in other cases from fluctuation and percussion. Another point of impor-

tance, in reference to such cases, is the possibility of a mechanical obstruction to the function of that part of the bowel which is involved.

In a case seen with Dr. Moore, this appeared to us to be the cause of the severity and alarming nature of the symptoms. The patient had been confined about a month previously, and being out for her first drive, she imprudently got out of the carriage, and sat for a short time on a bench in an exposed part of the park. On her return home she felt unwell. The following day acute pain was complained of in the left side above the groin, and the symptoms generally went on increasing in severity, while a tumour became developed in the region referred to. This tumour was irregular in shape and indistinct in outline, but, being exquisitely tender, it was difficult to make a satisfactory examination of it, further than that it was manifestly connected with a corresponding fulness which was easily recognised from the vagina. It was with the greatest difficulty that the action of the bowels was maintained: the tympanitic distension was enormous, and for some days the occurrence of obstinate vomiting prevented the administration of any remedies, or almost of any food by the mouth. Considerable benefit was derived from the use of suppositories containing tar, but it was on several occasions found necessary to give egress to the pent-up flatus by the use of O'Beirne's tube. Ultimately, after a long and anxious illness, this lady recovered, and the tumour disappeared.

We have here to do only with those cases of pelvi-peritonitis which are associated with the puerperal state, which constitute, indeed, nearly a half of all cases from whatever cause arising. The disease, of course, originates, in almost all of this class of cases, in the uterus, and the affection is therefore one of metro-peritonitis; and this portion of the peritoneum is the more likely to be the seat of the lesion, the sooner the symptoms are developed after delivery. If after a longer interval, the chance of its being inflammation of the appendages is proportionally greater.

Diagnosis.—In attempting to form a diagnosis between pelvi-peritonitis and pelvic cellulitis, the following are among the more important points which it is proper to bear in mind. In the former, the affection is usually, though not invariably, limited to the true pelvis, and may be distinctly recognised from the vagina; in the latter, the true phlegmon, originating in the cellular tissue, cannot be reached from the vagina, but, tending to spread towards the iliac region, can usually be made out by hypogastric palpation at an early stage of the case. The tendency to the formation of abscess and discharge of pus is greater in cellulitis than in peritonitis, so that the symptoms indicating the formation of

pus may come to be of some importance in doubtful cases. If it be correct to assume that pelvic cellulitis, when it follows labour, generally originates in the broad ligaments, we can have no difficulty in understanding how tumours, originating in pelvi-peritonitis, and thus being intimately connected with the uterus, are not only more within the reach of the finger, on examining per vaginam, but are frequently found to produce marked displacement of the uterus, in proportion to the size of the swelling. In the more chronic variety, the diagnosis of pelvi-peritonitis may involve doubts as to the nature of the tumour which is recognised from the vagina. The difficulty is supposed to be greatest in the case of the affection which has been termed "engorgement of the uterus" in which the tissue proper of the uterus is increased in volume; but the regularity, in these cases, in the outline of the tumour, its mobility, its firm consistency, and the transmission downwards of movements communicated to it from above, will probably serve to enable us to form a pretty confident opinion. Uterine displacements of various kinds and fibrous tumours may also be mistaken, and erroneously supposed to be tumours which are the result of pelvi-peritonitis.

Formation of Abscess.—The formation of an abscess is probably the result which, in puerperal cases, we look to with the greatest apprehension. It is only since Bernutz's investigations that it has been fully recognised that pus may accumulate in the form of abscess, not only in the cellular tissue but also within the peritoneum. This, indeed, forms a most important practical analogy between pelvi-peritonitis and the familiar pelvic cellulitis of most writers. The majority of all pelvic abscesses, occurring at the period of which we speak, are probably due to the latter affection; but some of our most able gynæcologists hold a contrary opinion, and believe that intra-peritoneal purulent collections form the majority of grave abscesses in this situation. Supposing it to be admitted that the idea generally entertained as to the origination of pelvic cellulitis within the folds of the broad ligament is well founded, an interesting subject of investigation is thus suggested. Nor can we wonder that numerous dissections have been made, and experiments by injection or inflation of the cellular tissue performed, with the view of determining what direction an abscess in this particular situation is likely to take. The question is however, far from solved, and we certainly find abscesses taking quite unexpected directions. "The most frequent extension of parametric abscesses," writes Matthews Duncan, "is either upwards, or into the iliac fossa on either side. But they may go much further. They may extend along the rectum to the perineum. They may extend to the

kidneys. They may, in assuming these directions, attack only cellular tissue, or, in addition, may lead to destruction of muscles, as of the psoas and iliacus. I have dissected such abscesses in the puerperal state, and in connection with non-puerperal disease, extending from the kidney to the uterus." It is well known that these abscesses sometimes burst into the rectum, bladder, or vagina, and the detection of pus in the fæces or in the urine may afford the first clear evidence of the nature of the case. The opening into the rectum, indeed, is one of the most favourable terminations of such an abscess. The opening into the bladder may determine a troublesome urinary disorder, but is not so unfavourable as might perhaps have been supposed. Fortunately, the opening into the peritoneum is of rare occurrence.

One of the most important practical points connected with these abscesses, whether they be parametric or perimetric, is the method to be employed for the detection of pus. Every clinical student is taught that fluctuation is the most reliable sign of the presence of fluid within a cavity which it fills, and is instructed how to apply the test, the manipulation being somewhat varied according as the accumulation is large, as in ascites, or small, as in an ordinary superficial abscess. In this strict sense, however, fluctuation is very rarely available in the diagnosis of pelvic abscess, for the obvious reason that, while we require, to produce real fluctuation and at the same time to appreciate it, two hands, as a rule, in the investigation of these tumours, one hand, or it may be one finger only, is available. The circumstances under which actual fluctuation is then discoverable are to be found in those cases only in which the tumour has reached above the pelvic brim in the direction of the iliac fossa or elsewhere, or when it is possible to produce the wave of fluctuation between the fingers in the vagina and the other hand applied to the abdominal wall. The presence of fluid may, however, often be recognised quite easily by the finger in the vagina, but there are many cases in which to be certain requires a high degree of the *tactus eruditus*. "This is, however," as Dr. Duncan observes, "not feeling fluctuation. It is merely the educated finger picking up such sensations as enable the mind to perceive a collection of fluid in a cyst or bag. The finger cannot both produce fluctuation and feel the shock of the wave."

Treatment.—The management of pelvic cellulitis and pelvi-peritonitis depends, in the first place, and very obviously, upon the nature of the case. It will depend, moreover, upon whether the symptoms are acute or chronic, whether the disease is progressive or stationary, and whether there is already evidence of the formation of an abscess. It is quite clear, therefore, that, on many points, the ordinary principles of

surgical treatment must be our guide; but, in so far as the treatment to be pursued is identical with what a moderate acquaintance with clinical surgery would indicate, we shall not follow the subject. There are, however, many special practical considerations, most of which experience alone can teach; but to one or two of these we may here briefly advert. Of the symptoms which call for prompt treatment, none is of more importance than local pain. If the seat of the pain reaches above the brim, nothing is more grateful to the feelings of the patient than the application to that region of poultices and fomentations, which may be sprinkled with laudanum, or otherwise modified to suit the exigencies of the case. When the tumour is more truly pelvic, and can only be felt from the vagina, the vaginal douche sometimes gives temporary relief, and, in other instances, medicated pessaries, such as were recommended by Sir James Simpson, may be employed. Bernutz strongly advocated the internal use of conium, and it may even be necessary to use some of the preparations of opium.

The sufferings of the patient are sometimes greatly aggravated by the pressure which the tumour exercises on neighbouring viscera, especially the bladder and the rectum, when the functions of these parts may be seriously interfered with. The exact nature of this class of symptoms will entirely depend upon the anatomical relations which the tumour bears to contiguous parts. When the pressure is forwards, in the direction of the pubic symphysis, the suffering from pressure upon the neck of the bladder is sometimes excruciating, and, as one result of this may be constant calls to micturate—which is often effected with difficulty—the pain which is thus produced may be intense. In some instances, the bladder can only be emptied by the regular use of the catheter. When the pressure takes the other direction, the suffering is not so severe, but there is almost always more or less pain in the back. In some cases, there is obvious mechanical interference with the function of the bowels, the difficulty in the act of defæcation, and the flattened condition of the fæces, showing clearly the nature of the case. In other instances, there is apt to be obstruction of a more serious nature, as in pelvi-peritonitis involving the bowel, when the patient suffers much, both from obstruction and from flatulent distension. In every such case, the action of the bowels should be scrupulously watched, and, on the slightest sign of obstruction, immediate means must be taken to prevent the possibility of serious results, by the combined action of laxatives and enemata. A simple injection of soap and water, with or without turpentine, may, in such cases, be given every night,—a mode of practice which will, in many instances, contribute to the comfort of the patient.

The treatment, generally, of a case will divide itself into the arrest of inflammation, the promotion of absorption, and the discharge of pus when an abscess has actually formed. It is with the view of fulfilling the first of these indications that blood-letting, in such cases, is usually recommended. Few persons will, probably, think of general blood-letting. It is, at least, difficult to conceive a case in which the circumstances would warrant such a measure. It is otherwise, however, as regards leeching, from which, in some instances, very marked and decided benefit may be anticipated. Leeches may be applied to the groins, the perineum, or the uterus; but, although blood drawn from any of these situations may be productive of excellent results, it is obvious that the direct abstraction of blood from the uterus—more especially if that organ is involved, primarily or secondarily, in the morbid action—is the procedure from which we may anticipate the most marked effect. But, if the nature of the case be such that it is impossible to introduce the speculum, the leeches may be applied to the vulva, taking care that they do not bite too high; for it has happened that very troublesome bleeding has been the result of the application of leeches to the vagina, from the difficulty of reaching and controlling the bleeding point. "I believe," says Bernutz, "that four leeches applied to the cervix are as good as three times that number applied externally, for not only is it nearest to the seat of inflammation, but the relief to all the genital organs is greater. I do not think even scarification can be compared with leeches, in point of utility; the amount of blood drawn off is, comparatively speaking, quite insignificant; and there is the possibility of serious consequences resulting."

It is never necessary to apply more than three leeches at a time to the os and cervix, for, if the quantity of blood which is withdrawn should not be deemed sufficient, the flow may be encouraged by a warm hip-bath, by means of which the quantity may often be regulated at will. As a rule, it is not advisable to aim at the abstraction of a large quantity of blood, as a very moderate discharge is all that is necessary thoroughly to deplete an organ of the size of the womb; but, besides this, there is the danger of interfering with the menstrual function, should we push depletion too far,—more especially if the period be at hand. In the actual application of the leeches, some nicety of manipulation is sometimes required, to prevent them from crawling round the edge of the speculum, when they will probably fix upon the vagina, or even pass out by the vulva; and, as it has happened that disagreeable symptoms have resulted from the leech making its way into the uterus, it is recommended, in pluriparæ, or in any case where the aperture is

large, to put a small plug of wool in the gaping os. It is to the acute stage, mainly, of the cases of pelvi-peritonitis, in which the uterus or its appendages are assumed to be the original seat of the disorder, that leeching is applicable; but there are, undoubtedly, cases of cellulitis in which congestion of the womb exists as a complication, where the treatment is precisely similar. And, at any stage of the more chronic forms, an exacerbation of the symptoms may present such features as clearly to call for local depletion. In the present state of our knowledge, it will not do to pause in these cases until our diagnosis is complete. The indications which point to blood-letting as the proper remedy at the time being clear, it is a very secondary matter to determine whether the peritoneum or the cellular tissue is the part involved.

Poultices, fomentations, hip-baths, and the vaginal douche are extremely valuable agents, in these as in other affections, in controlling inflammatory action, and, as has already been observed, in alleviating pain. But the fact is that there is no stage of the disease at which this class of remedies may not be found beneficial. They should be employed continuously in the acute stage; and, in the case of an abscess which threatens to point externally, the application of poultices may also be diligently carried out. In cases where the result of the inflammatory action has been the formation of a tumour, or more diffused hardness, it comes to be a question whether nothing can be done with the view of promoting absorption. At one time, when the professional belief in mercury was unbounded, that drug would naturally have suggested itself as an essential part of the treatment either in the acute stage, in that of which we are now speaking, or in both. It must be confessed, however, that comparatively little faith is now placed in mercury as a remedial agent. Many reject it absolutely, in this and other diseases; but, in so passing from the abuse to the absolute neglect of the drug, we think that the modern physician, as in the case of general blood-letting, has gone too far. We should certainly recommend that the patient may have the chance which such a remedy affords her, but, if there be anything to contra-indicate the use of mercury, it may be abandoned with less regret than if we had more faith in its action. The most suitable preparation is the perchloride, which may be administered in doses of $\frac{1}{16}$ of a grain, and should never be carried beyond the stage at which the gums, &c., indicate faintly commencing mercurialization.

Iodine is another remedy of the same class, which many will employ with less hesitation, either in the form of iodide of potassium internally, or, it may be, by the external application of the tincture or ointment.

The latter may be applied when the tumour is hard and chronic, and can easily be recognised through the abdominal walls; or they may be employed in similar circumstances through the vagina, a method of treatment which has been found beneficial in many of the uterine disorders familiar to the gynæcologist. Blistering, after the acute stage is past, has been strongly advocated by some, and no one will deny that experience would encourage us to look to this mode of treatment for satisfactory results; but we confess to a preference for the external application of iodine, by which irritation may be maintained for a long period, its action being, of course, kept within moderate bounds so as not to irritate too much.

In cases in which pelvic abscess has formed, and the ordinary signs reveal that pus is present in considerable quantity, it comes to be an important practical point whether we are to operate by incision or leave the case absolutely to nature. In so far as can be gathered from the experience of modern practice, abscesses, wherever existing, are now much less frequently opened than was the ordinary practice of a quarter of a century ago. But, whatever be the case as regards ordinary surgical practice, it is certain that, in the management of pelvic abscesses, particular care and discrimination is necessary. Caution is more imperatively demanded when the tumours show a tendency to point in the groin or elsewhere above the pelvis; but it must at the same time be remembered that, while the danger of premature operation is admitted, the greater danger of rupture of the sac and escape of its contents in the peritoneal cavity must not be overlooked. Some have said that such an abscess should be opened *when it threatens to burst into the peritoneum*, but in what this threatening consists, or how we are to recognise the danger, is what no one has attempted to show. If the abscess is acute in its history and progress, it is better to leave the operation to nature; but, if it is mature and chronic, and shows no tendency to point externally, it comes to be a very delicate matter to determine whether we shall operate or not. If we dread its opening into the peritoneum, we must at the same time bear in mind—what the experience of West, Bernutz, Aran, and others has clearly shown—that, even if we open an abscess, this does not prevent its subsequent perforation into the peritoneal cavity. If the symptoms of hectic fever manifest themselves, or if the tumour gives rise to great suffering the idea of operation will naturally receive encouragement; but, in the absence of these conditions, it is always better to wait. Pelvic abscesses may point at various situations externally which are well known to the surgeon, or they may only be reached through the vagina or even by the rectum, and, in doubtful cases, the preliminary

use of the aspirator may be indicated; but, in most cases, when the operation is resolved upon, the opening should be free so as to admit of a thorough evacuation of the cyst, availing ourselves as far as possible of the ordinary antiseptic precautions. "Old pelvic abscesses," Dr. Duncan observes, "demand even boldness in operating. . . . . I have repeatedly operated in cases where I knew the abscesses were several years old; and in such cases sometimes more than once; and I have never had reason to doubt the propriety of the treatment."

Peri-uterine Hæmatocele.—There is another class of pelvic tumours, the nature of which was recognised by Ruysch in 1691, but which has received very little attention except at the hands of modern gynæcologists. These are the sanguineous tumours—the result not unfrequently of menstrual accumulation outside of the uterus—to which the name of peri-uterine hæmatocele has been given. This question is too complicated to enter upon here, and, indeed, there is only one section of it—the intra-pelvic hæmorrhage occurring in extra-uterine pregnancies—which comes strictly within the scope of our subject. These tumours are merely mentioned at this place, as they might possibly give rise to difficulties in the diagnosis of the affection which we have just been considering.

Sudden Death.—Sudden death in the puerperal state is a subject which of late has attracted considerable attention, more particularly since the phenomena of thrombosis and embolism have been more thoroughly understood, as these are undoubtedly the cause of death in a large number of the fatal cases.

In the course of puerperal fever, as has already been stated, what we may call septic embolism is by no means of unfrequent occurrence. Among other localities, the detached clot may lodge in the pulmonary artery and its branches; and this is, no doubt, the cause of the secondary abscesses found in the lungs in certain cases of puerperal pyæmia. If a small branch only is occluded, the symptoms are correspondingly slight, but if the main trunk, or a large branch is blocked, death may either be immediate, or may occur after an interval, during which the leading symptoms are precordial oppression, dyspnœa, cyanosis, and a low temperature.

But it is not only in the course of a case of septicæmia that embolism may occur. The highly fibrinated condition of the blood, natural to the normal condition of the woman at this period, may be still further increased as the result of exhausting hæmorrhage, a condition manifestly favourable to the formation of thrombus, and the subsequent accident of embolism. The connection of phlegmasia dolens with pneumonia

and pleurisy has already been mentioned incidentally, but there is good reason to believe that attacks of so-called pneumonia in puerperal women, particularly when they occur in the course of phlegmasia dolens, are usually due to hæmorrhagic infarctions brought about by the transmission of a clot from the veins to the right side of the heart, and thence to the pulmonary artery. The symptoms of such an illness, with rigors, high temperature, hæmoptysis, and cough, very closely resemble those of pneumonia, and the physical signs reveal congestion and consolidation of the lung: not unfrequently pleurisy, with more or less effusion, complicates such accidents. In the further progress of the case, there may be evidence of the destruction of a limited portion of the lung or of the formation of a localized pulmonary abscess.

The following account, condensed from the notes supplied to the writer by Dr. E. M'Millan, affords a remarkable instance of the recurrence of pleuro-pneumonia in the puerperal state, due in both instances, no doubt, to embolism of the pulmonary artery, although the first illness was not regarded in this light at the time.

A primipara, 31 years of age, was confined at term on November 28th, 1874: there was no complication of any kind in the labour. Ten days afterwards she had pain in the calf of the *right leg*, without any marked swelling. Fifteen days after her confinement she had pain in the lower part of the *left lung* posteriorly, this became very acute in a few hours and resembled a pleuritic stitch; subsequently rusty expectoration and dulness on percussion supervened, and the diagnosis of pleuro-pneumonia was made; the case was not very severe, and she began to improve quickly, and was pretty well by January 1st, 1875. On this day, however, severe pain began in the *left leg*, and swelling supervened as in well-marked phlegmasia dolens; this part of the illness lasted a month. (A fatal case of scarlet fever occurred in the house about this time; the child, however, took ill a day or two after the lady began to complain of pain; the patients were completely separated, and, so far as appeared, there was no connection between the two illnesses, the child having evidently contracted the fever at school.)

Her second confinement occurred on April 10th, 1877; the labour was short and natural. On April 14th, early in the morning, she had a severe rigor and was feverish and excited, with at times a feeling of faintness; a slight shivering occurred in the forenoon, and another rigor, more severe, at night, lasting twenty minutes; she felt very ill and thought she was dying; there was no pain over the uterus or anywhere else; up till this she had been nursing the baby, but the milk now ceased. On the following day the temperature continued high, 103°

in the evening. Next day, April 16th, the temperature reached 105° in the morning, and after falling a little, mounted to 104° in the evening, when there was another shivering. Next morning, April 17th, the temperature had fallen to 99°, but in the evening another rigor occurred, and the temperature rose again; cough and rusty expectoration now began, and she complained of pain in the back and in the *left side of chest;* physical examination showed signs of consolidation and pleuritic effusion on that side. Thereafter the fever continued in a somewhat remittent manner for a month; the expectoration, of bloody character, continued more or less all that time, sometimes lighter sometimes darker in colour. She was often troubled greatly with the cough, and sweating became a prominent symptom in the case. Occasionally the expectoration was very profuse, and at times noted as creamy. The subsequent part of the illness was complicated by partial pneumonic consolidation on the right side, by slight sore throat, and a small superficial mammary abscess; but she was able to sit up a little by the month of June, and made a complete recovery. The physical signs in the chest disappeared slowly.

According to Dr. Playfair,[1] who has devoted great attention to the question of thrombosis of the pulmonary artery, we may find the symptoms of obstruction in the pulmonary circulation *before* the appearance of phlegmasia dolens, and he argues with considerable plausibility that the process of thrombosis in such cases had begun simultaneously in the pulmonary artery and the iliac vein, as some time is required for the development of the swelling of the leg. Of course the facts are open to another interpretation, that the symptoms of mischief in the chest were due to the displacement of clots from the uterine or other veins at the very commencement of the venous thrombosis which was leading up to the phlegmasia dolens.

The same writer contends strongly for the view, that very serious or fatal obstruction of the pulmonary artery is frequently due to thrombosis rather than embolism, and points out that the cases may be divided into those in which the fatal mischief occurred within a few days after labour, and those in which an interval of two or three weeks elapsed; in the latter group, evidence of embolism was presented by the post-mortem examination, and he considers that some time is required for changes to be developed in the clot to favour its detachment and transmission as a plug; in those cases, on the other hand, where death occurred early, he contends that there was no evidence of embolism, and that the more probable pathology is the formation of a clot in the pulmonary artery

[1] A Treatise on the Science and Practice of Midwifery. London, 1878, vol. 2.

itself. This question is a complicated one, for we may have a small embolus forming the nucleus of a large thrombus, and a thrombus in the pulmonary artery not sufficient to cause very serious consequences may suddenly present a fatal obstruction when the remaining space is blocked up by an embolic clot.

When the clot is large enough to present a serious obstruction, the symptoms are those of the most sudden and aggravated dyspnœa, characterised by gasping and struggling for breath, associated sometimes with pallor and sometimes with lividity, the heart's action is tumultuous and the pulse extremely small: death may result in a few minutes. It is worthy of note that this fatal accident often occurs without anything to warn us in any way of impending danger, and it seems frequently to have taken place in connection with some exertion, as on rising from bed, arranging the hair, &c. Some of the patients appear to have recovered from this formidable accident, and the treatment to be adopted if medical aid can be procured in time, is by very free stimulation of all kinds, and by the exercise of the most extreme caution as regards exertion.

Cerebral embolism is also an occasional cause of sudden death in the puerperal woman, but even when rapidly fatal there is not the extreme suddenness which is observed in the accident which has just been referred to. Several interesting cases of cerebral embolism after parturition have been narrated by Hughlings Jackson, Fordyce Barker, and others: as in other cases of this lesion, the middle cerebral artery on the left side seems to be the most frequent site, and so we find that aphasia is one of the symptoms occasionally observed. From the narrative of two cases carefully observed by Dr. Finlayson in the Glasgow Western Infirmary, it would appear that there may be a repetition of this accident. Both of the women referred to suffered from aphasia, which came on within a few days after labour, and, after making a tolerably complete recovery, both were seized after their next labours with a very aggravated and persistent form of the aphasia: in one of the cases the right hemiplegia was extreme, but in the other it was slight.[1]

The entrance of air into the veins is well known to be a cause of sudden death. There is no doubt that the provisions of nature after delivery are not such as to favour the ingress of air to the uterine veins; but it has been demonstrated that under a certain degree of pressure it is possible, and it is believed by some to be a rare cause of sudden collapse.

[1] Glasgow Medical Journal, September 1879.

Anæsthetics.—Forty years ago, no one could presume to write a treatise on midwifery without an elaborate disquisition on the subject of anæsthesia. The then recent discovery of chloroform and of the anæsthetic power of sulphuric ether was an era in the history of surgery; and we cannot wonder that the obstetrician should have claimed for his art the immunity from pain and the other advantages of which his surgical brethren were so gratefully availing themselves. We look back to this period (*circa* 1848), and turn over the pages of the pamphlets which mark the bitterness of the controversy which was then being waged, with a feeling partly of amusement and partly of humiliation. The theological tone which was prevalent in some quarters is the most extraordinary feature in the whole affair; but how sensible and able men could write such trash, and argue gravely against the iniquity which was being perpetrated in relieving women from the effects of the Divine curse "*in dolore paries*," will ever remain an inscrutable psychological phenomenon.

There are many agents which have been classed as anæsthetics, and there no doubt are many more. At present, ether and chloroform are the only two which are habitually employed; and to these we may perhaps add chloral, as it is now pretty well known that a patient, thoroughly under the influence of this drug, may go through the whole stages of labour without any sensation of pain or any consciousness of the process which is going on. Ether and chloroform, however, the one in America and the other in this country, are, from the evanescent nature of their effects, preferred to those agents whose operation is more permanent, and after which disagreeable results are more likely to accrue. At first, partly from the impulse and surpassing interest given to the subject by its eminent discoverer, chloroform was used somewhat indiscriminately in cases of labour which were in all respects normal; but subsequent experience has shown that such wholesale use of anæsthetic agents cannot be supported, either by argument or by practical experience.

The result of numerous experiments has proved that chloroform, which is sparingly soluble in the blood, travels through the circulation in considerable quantity, in an uncombined state. It having a strong affinity for oxygen, the ordinary chemical changes which normally take place in the blood, are thereby materially interfered with, and Dr. Snow has shown that, in consequence of this, the quantity of carbonic acid evolved from the lungs is materially diminished. Such an effect, if of short duration, will probably produce no very serious result upon the economy; but should the action be unduly protracted—which is necessary, if we wish absolutely to annihilate pain in labour—we can

well imagine that the ultimate results may be in some way or other unsatisfactory. It has frequently been observed, and many have noted it as a remarkable fact, that the effect of chloroform does not seem in any way to arrest or even to modify the expulsive efforts; but, if we bear in mind what has been said in regard to the reflex action produced by an excess of carbonic acid in the blood, the experiments of Dr. Snow afford a ready explanation of this, which was at one time supposed to be a phenomenon, unique in itself, and of great interest.

The effect of chloroform on the nervous system is, however, the point in regard to which, in the practice of midwifery, the greatest amount of interest attaches. In the view which we take of the subject, by far the most important point is that a moderate dose of chloroform may annul, or at least deaden sensation, without distroying consciousness or the power of motion. This enables us to alleviate the sufferings of our patient by a trifling dose, and without bringing her fully under the influence of this powerful agent. The interference, therefore, with the chemical changes which are constantly going on in the blood is proportionally diminished. The further we push the administration of chloroform or of the other anæsthetics, the more thoroughly is the cerebro-spinal or reflex function influenced, until at last the motor fibres of the respiratory nerves are affected, and stertor indicates that the *Ultima Thule* of safety has been reached.

The disadvantages of chloroform in the practice of obstetrics are, in the first place, the tendency to vomiting, which is so apt to be produced in the course of its administration. For obvious reasons, however, the stomach rarely contains much food at the period of delivery, and this is no doubt the reason why vomiting is, in midwifery practice, comparatively rare. Still, it does occur; and—more than that—it occasionally persists for a considerable time, to the manifest disturbance of the patient during the post-partum period. Partly on this account, and partly, it may be, in consequence of the effect which is produced on the nervous centres, it has been pretty clearly established that the indiscriminate use of chloroform predisposes to hæmorrhage after delivery. Another danger of chloroform is the tendency to failure of the heart's action, which is often so rapidly and unexpectedly produced, especially when deep anæsthesia has to be effected. This failure of the heart's action and of the blood pressure in the arteries is much less liable to occur during the use of ether, and the writer has much pleasure in referring to the important results obtained by the experiments of his colleagues, who reported on this subject to the British Medical Asso-

ciation.[1] Another objection which has been stated is perhaps of less importance—that in operations, the annihilation of sensation removes what was before a reliable safeguard, as, for example, when the blades of the forceps are applied, the patient is no longer conscious of the pain caused by including a portion of the vaginal mucous membrane in the lock—the suffering produced by which would previously have caused her to cry out.

The question of anæsthetics seems to us to stand thus. In eclampsia, in some cases of mania, in all cases of operative midwifery, and especially in cases of turning, they are, without exaggeration, invaluable. In ordinary cases, they are always to be used with caution; but, if employed in small quantities on a handkerchief on the approach of each pain, towards the termination of the second stage, they can never do harm. They thus allay pain and assuage nervous irritability, and, in the hand of the skilful practitioner, they are a power for good and never for evil.

[1] Reports on the Action of Anæsthetics, by Joseph Coats, M.D., William Ramsay, Ph.D., and John G. M'Kendrick, M.D., British Medical Journal, Jan. 4, Jan. 25, and June 21, 1879.

APPENDIX.

THE BI-PARIETAL OBLIQUITY OF NAEGELE.

For reasons which have already been stated, but chiefly with the view of avoiding controversial matters in the text, I have thought it better to express, in the form of an appendix, the reasons which have led me to reject the theory of bi-parietal obliquity as an element in the mechanism of parturition. The following observations, with some modifications, are mainly taken from my work on the "Mechanism of Parturition," published in 1864. The error of Naegele is certainly not so commonly taught as it was once, and many distinguished teachers and writers have completely abandoned it; but the fact of its still being a matter of common belief, together with the respect which is due to any doctrine having the stamp of the authority of the distinguished Professor of Heidelberg, makes it both necessary and fitting to analyze the subject with some care. But, as some doubt has occasionally arisen in regard to the exact nature of Naegele's views, it will be proper first to make sure what his opinions were, before proceeding to refute them.

In his celebrated essay, originally published in Meckel's Archiv, Naegele describes, in addition to the pelvic and occipito-frontal obliquities, a third obliquity, the *bi-parietal*. He maintained that, in regard to its transverse measurement, the head entered the brim obliquely, "so that the greatest breadth of the skull (from one *tuber parietale* to the other), as also the breadth of its base, never in its passage, under ordinary circumstances, coincides with the diameter of the brim." On this point he says also, in describing the first position:—

"The head has not at the brim a direct but a perfectly oblique position, so that the point which lies lowest or deepest is neither the vertex nor the sagittal suture, but the right parietal bone. The sagittal suture is nearer to the promontory of the sacrum than to the pubes, and divides the *os uteri*, which is directed backwards, and generally somewhat to the left, into two very unequal parts. . . . . The higher the head is, the more does its long diameter approach the transverse of the brim, and the more oblique is its position, on account of which the right ear can generally be felt without difficulty behind the pubes, which would not be the case if the head had a perpendicular direction."

These extracts leave no room for doubt that his meaning was really a lateral flexion of the head, an approximation of the ear to the corresponding shoulder.

He also describes, but in terms which, being somewhat vague, have led to some misapprehension, that there is a bi-parietal obliquity at the outlet; but in this he is, as has been observed in the chapter on the "Mechanism of Parturition," quite correct. The following observations, it is proper here to explain, have reference to the first cranial position.

Bi-parietal obliquity.—It will be understood that, in considering the second kind of obliquity—that, to wit, by means of which the head being rotated on its occipito-frontal axis brings the left ear, in the position which we are considering, towards the left shoulder—I must, in pursuance of my plan, view the head in reference to the axis of the brim alone. The presenting point of the cranium I shall consider throughout, until the head reaches the floor of the cavity, as that through which the axis of the brim passes, its situation being altered only by a variation in the different kinds of obliquity.

Many modern writers, including eminent obstetricians of our own time, agree in adopting Naegele's view with reference to this obliquity. It is therefore with much diffidence and hesitation that I here submit a contrary opinion, although I have only convinced myself of its truth after a careful and laborious study of the progress of labour. I am persuaded that, in a pelvis of ordinary dimensions, the usual course of labour is for the head to enter directly in the axis of the brim, with the sagittal suture equidistant

Fig. 206.[1]

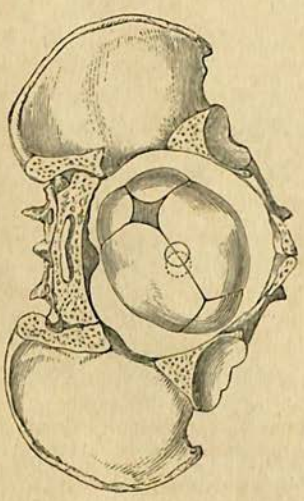
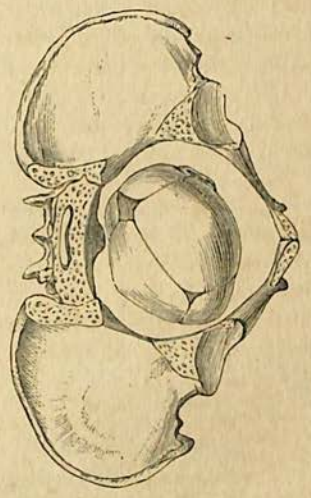


Fig. 207.



from pubes and sacrum. The accompanying illustrations show this more plainly, and in both the observer will remember that he is looking *upwards and forwards*, the axis of vision corresponding to that of the brim. The direct position, as here shown, is in most respects the same as that which was

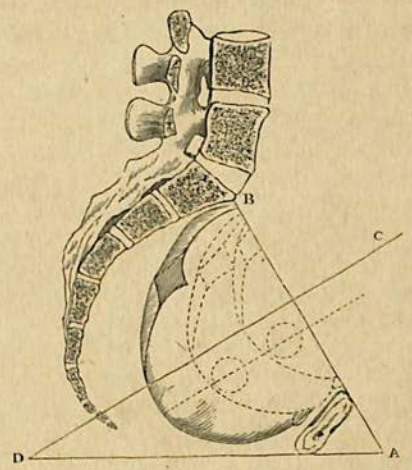
[1] In Figs. 206 and 207, the floor of the pelvis has been removed by a section, including the greater part of the walls of the cavity. In Fig. 206, the head is represented as descending directly in the axis of the brim. The dotted circle shows the effect on the apparent position of the os uteri of a slight displacement to the side. In Fig. 207, the head is represented as descending in the position described by Naegele.

taught by the leading obstetricians who immediately preceded Naegele. He, however, discovered and first announced the incontrovertible fact which is set forth in the following words :—

"The finger which is introduced in the central or middle line of *the pelvic cavity*, and brought in contact with the head, will touch the right parietal bone in the vicinity of the tuber. . . . . At the brim, the head does not assume a direct, but a perfectly oblique position (*keine gerade, sondern eine ganz schiefe Stellung*), so that the part which is situated lowest or deepest is neither the vertex nor the sagittal suture, but the right parietal bone."

I repeat that the fact thus stated in general terms is incontestable, inasmuch as it obviously refers to the axis of the cavity; but Naegele goes beyond this, and pushes his conclusions much further than the facts of the case warrant, when he says that the sagittal suture is nearer the promontory of the sacrum than the symphysis pubis, and that the bi-parietal measurement can *never* during labour coincide with the plane of the pelvic entrance. I may mention here that, although I began my study of the subject with a firm conviction that Naegele was right in this particular, I have been step by step driven to the conclusion that he is perfectly wrong. It is perhaps unnecessary to say that the view which I take of the position of the head at the brim is, albeit somewhat heterodox, far from original. Nor is the doctrine without powerful supporters, as this is the view entertained and clearly expressed by Velpeau and Cazeaux in France, and more recently in this country by Dr. Matthews Duncan; and several other observers, among whom I may mention Drs. West and Paterson,[2] have arrived independently at the same conclusion, which they have expressed in a more cursory but not less decided manner. M. Cazeaux describes it as follows :—

Fig. 208.[1]



"Avant la rupture de la poche des eaux, la tête du fœtus est légèrement fléchie sur le devant de la poitrine, et les rapports des diamètres de la tête avec les

[1] Fig. 208 shows the great amount of lateral obliquity (*quâ* the horizon) of the head advancing in the axis of the brim, the centre of the sagittal suture being, although much nearer the *sacrum*, exactly midway between the promontory of that bone and the symphysis pubis. It shows also how, during the whole of this stage of labour, the right tuber parietale may be described, in general terms, as the part which first meets the finger, or as lowest in the pelvis, advancing as it does in the direction of the dotted line parallel to the axis of the brim. If the head were in the transverse position, the sinking of the tuber parietale would be still more decided, but in that case it would be slightly to the left of the middle line.

A B The plane of the brim meeting the horizon at an angle of 60° at A.

C D The axis of the brim passing through the centre of the sagittal suture and the coccyx, and meeting the horizon at D at an angle of 30°.

[2] Glasgow Medical Journal, October, 1862.

diamètres du détroit supérieur sont les suivants ; le diamètre occipito-frontal est parallèle au diamètre oblique gauche du détroit supérieur ; le diamètre biparietal est parallèle au diamètre oblique droit ; la circonférence occipito-frontale de la tête est parallèle au pourtour du détroit supérieur ; l'axe de ce détroit supérieur passe par le diamètre trachélo-bregmatique."

The arguments of Nagele on this point are stated, as indeed all his views are, with great clearness and precision, and are, I admit, apparently conclusive and convincing. But I do not despair of being able to show that he has been led into error, if my readers will only deign to put aside for a time a preconceived opinion, and study the subject in nature. I may fail in any argumentative attempt to show that Naegele was wrong, or I may be met with reasoning more subtle than my own ; but I would only ask that as my arguments are founded upon practical research, those who would refute them should test the matter fairly—a test which will involve some labour, but which is within the power of every practitioner in midwifery.

In admitting the general accuracy of most of Naegele's descriptions, I assume that the fundamental error from which, more than any other, his mistake arose, was ignorance, at the time he wrote his essay, on the subject of the great obliquity of the brim in respect to the horizon. There must, I think, have been remaining in his mind some remnant of the old idea of the *horizontal* brim ; for it must be remembered that his attention was not directed to the subject of the relation which the pelvis bears to the trunk and limbs, until some years after the date of the publication of his paper on the mechanism of parturition. If the brim were indeed parallel to the horizon, or nearly so, the fact of the finger meeting the parietal bone in the vicinity of its tuber would be clear and irrefragable evidence of the so-called lateral or bi-parietal obliquity of the head. But if we do not allow ourselves to lose sight of the fact that the brim is inclined at an angle of 60°, and that the vertex or presenting part passes downwards and backwards so obliquely as to meet the horizon at an angle of 30°—even admitting that the right parietal bone in the vicinity of its tuber is the lowest part in the pelvis—I cannot see how this is to be accepted as evidence of anything else than that the head is advancing directly in the axis of the brim, but very obliquely with regard to the cavity, and still more so with reference to the horizon, as is shown in Fig. 208.

If to this great and admitted obliquity we superadd that which, according to Naegele, separates the sagittal suture from the axis of the brim, so as to bring the middle part of the suture opposite the fourth division of the sacrum ; "whether," says the younger Naegele, "the head stands deeper or shallower," we must first believe that the trachelo-bregmatic measurement is as nearly as possible parallel to the horizon.

The first difficulty which shook my conviction in the accuracy of Naegele's statement was here encountered. Granting for the moment that his description is correct, let any one take a fœtal skull and place it in the dried pelvis in such a position that the vertex is approaching its floor, with the sagittal suture directed as above described, when he will find—and there is, I think, no avoiding this conclusion—that the ear could in all circumstances be felt

with the greatest ease; and yet we all know that it is almost always a matter of considerable difficulty to reach the ear at this stage, even more so indeed than when the head is situated higher. This difficulty has not by any means been overlooked by Naegèle; but having adopted one fundamental error, he makes this the standard by which he gauges deviations from his theory, and thus is inevitably led further astray. He explains it thus—"The higher the head is, the more oblique is its direction, for which reason the ear can generally be felt behind the pubes without difficulty, *which would not be the case if the head had a straight direction.*"

I admit that on the first blush this argument has a significance, which it does not, however, maintain on closer examination. In the first place, he commits himself to the opinion that this alleged obliquity has no reference to the resistance which the head experiences from the pelvis, inasmuch as it is greater before this resistance can have come into play. He then goes on to assume that the fact of the ear being felt behind the pubes at an early stage of labour, is a proof of this obliquity. With reference to this point, I would remark that he seems to me, throughout his whole essay, to put too much weight on the facility with which the ear may be felt at the beginning of labour. That it may in many cases be so felt is an undoubted fact; but as far as my experience goes, I have in the great majority of cases found it no such easy matter to reach the ear, in any stage of labour, as Naegele would have us believe. When I can so reach it, it only proves to me, what Naegele himself admits, that the head approaches the transverse diameter more than usual. For it must be remembered that the upper part of the pubic symphysis is within easy reach of the outlet, and that, on account of the inclination of the brim, when the ear moves to the side it moves at the same time *upwards* along the ilio-pectineal line, and consequently further from the finger. This then is a mere assertion of Naegele's; his proofs are in no degree incompatible with the idea of a direct entrance of the head. I am quite willing to admit that in some extreme cases in which the ear is felt with unusual ease, as well as in other rare occasions, there may be some exceptional obliquity; but I am perfectly convinced that this is the exception, and the direct entrance the general rule. But there are other arguments familiar to every obstetrician which must be met, and, if possible, refuted.

"The sagittal suture," says Naegele, "divides the os uteri, *which projects backwards and generally somewhat to the left*, across into two very unequal segments." Mark how ingeniously he argues from a preconceived opinion, and trims his facts to suit his theory. We may allow the alleged inequality of the segments in the meantime to pass; but as this is quite insufficient to account for the amount of obliquity which he describes, he maintains that the os is displaced in the very directions which suit his argument—viz., backwards and to the left. For it will be observed, on a reference to Fig. 206, that the effect of a slight displacement to the left is, in the direct position at the brim, to throw the small segment forwards, and it will be understood at a glance that the further effect of a displacement backwards would be to leave the sagittal suture concealed by the anterior lip of the os; whereas, by bending

the head towards the left shoulder, his theory restores the relative positions of os and suture. This is the flimsiest of all his arguments, inasmuch as it is purely theoretical, and depends entirely for its accuracy on the correctness of his original statement in regard to the obliquity. The difficulties in determining the relations of the os during labour are very great; but taking, as I do, the fact of the sagittal suture crossing the os at the beginning of labour as evidence of the direct entrance of the head, I see no reason to doubt that the centre of the os corresponds pretty nearly to the axis of the brim. I even doubt the general accuracy of the assertion that the smaller segment is behind, and I have certainly, at an early stage of labour, found it to vary considerably in this respect. Dr. Paterson, who, although admitting this fact, is nevertheless convinced that the head enters the brim directly, attempts to account for it by supposing that the os is displaced forwards; but I rather think that he has no more proof to offer of this statement than Naegele had of his, or than I might have if I chose to assert that the os was always displaced to the right merely because this would suit my purpose.

The statement which accompanies the above, to the effect that the sagittal suture is much nearer to the promontory of the sacrum than to the pubes, is equally erroneous. But, with reference to this, a certain misapprehension is apt to occur, if we use, instead of the words of Naegele, the expression, "nearer the sacrum," which some modern writers employ. For, as a natural consequence of the head advancing in the axis of the brim, the suture is beyond all doubt nearer *the sacrum;* but it is as certainly no nearer *to the promontory of the sacrum.* I think there is no one who has a correct idea of the relation which the pelvis bears to the vertebral column, and who will introduce his whole hand with a view to determine the position of the head at the brim, who can fail to arrive at the same conclusion as that which I have attained. For my part, I have left no means untried by which this might be tested. On introducing an instrument which is well known to surgeons as Professor Buchanan's rectangular staff for lithotomy, I have been able to place the angle on the second bone of the coccyx, inclining the short limb until it coincided, as nearly as I could guess, with the axis of the brim, when it never failed to guide me, if properly placed, to the sagittal suture, or some point very near it, on either side. I have even attempted a crucial experiment by measuring, by means of a flexible scale, the distance from the sagittal suture to the promontory of the sacrum on the one hand, and the pubis on the other; and although, for obvious reasons, the results were not so accurate as to warrant of themselves any definite conclusion, they certainly tended to confirm my belief.

But the greatest difficulty of all, and the fact which, more than anything else, seems to confirm Naegele's theory, is the situation in which the tumour called the *caput succedaneum* forms, in those cases in which the waters have escaped, and the head is exposed at an early period of labour to the pressure of a rigid and undilatable os. On this point I have to acknowledge my obligation to Dr. Matthews Duncan, whose researches on the evidence afforded by the situation of swelling, as described by Naegele, solved my only remaining doubt on the subject. Every accoucheur has had frequent

opportunities of confirming the accuracy of the following statement of Naegele's, and which apparently affords striking corroborative proof of the accuracy of his assertions :—

"In certain circumstances, a swelling of the cranial integuments forms after the os has begun to dilate, which, in the further progress of labour, when the os changes its situation and direction, and the head its position against it, disappears again by degrees; nevertheless, as dilatation proceeds, it may still be felt for some time, although much softer. This swelling (in that position of the head which we are talking of) is situated upon the *right* parietal bone, close to its upper edge, and equidistant from both angles. Sometimes a small piece extends over the suture to the left parietal bone; its circumference depends upon the degree of dilatation which the os uteri has attained."

Now this situation of the swelling may indicate one of three things :—The os may either be inclined forwards; or it may be subjected to greater pressure at certain points of its circumference; or, again, the head may be placed obliquely. Of these, with the proof which I elsewhere have of the direct entrance of the head, I consider the last as the most improbable of the three. It must always be remembered that, to account for the degree of obliquity described by Naegele, we must adopt in addition his theory that the os is displaced backwards and to the left; but, nevertheless, we must endeavour to account for the fact that the bulk of the swelling at least is to be found over the right parietal bone. I have already alluded to the theory advanced by Dr. Paterson, that the os is inclined forwards, which would, if correct, afford a most satisfactory explanation of the phenomena as detailed above. Proof of its accuracy is, however, awanting; and indeed the difficulties which an examination offers are such that we cannot hope for a strict demonstration of the fact, even if true, unless we were to argue from the assumed fact that the entrance of the head was direct, and thus adopt the very error in reasoning which has led Naegele astray.

The theory by which Dr. Matthews Duncan attempts to account for this, demands a separate consideration. This able writer is of opinion, that it is a mistake to suppose that the thickest or most prominent part of the swelling corresponds to the centre of the area upon which it has been formed, but that this is to be found in the direction in which the least resistance is offered to its formation. Applying this argument to the formation of the swelling in this stage, he says :—

"The caput succedaneum of the first stage of labour is often formed after the head has passed the brim of the pelvis, and is lodged in the upper half of the cavity of the bony pelvis. Were we to be cautious and exact in reasoning, all such swellings should be excluded from the argument, for evident reasons. It is only those formed at the plane of the brim, or very near it, that can, under any circumstances, afford assistance in settling this question: under the actual deficiencies of exact data, we must be content with stating principles. Now it is evident that the direction of the caput succedaneum of the first stage will be that of least resistance—that is, the direction of the axis of the undilated vagina; in other words, the caput will be thickest where the head is least supported, and may, in other parts within the circle of the os uteri, be so inconsiderable as not to attract notice. Further, and for the same reason, the centre of the caput succedaneum, or the centre of the os uteri, will not correspond with the thickest portion of the swelling, but in this case be behind it, or near the left parietal bone. The oblique

direction downwards and forwards of the vagina will lead the caput in that direction, and the support given by the posterior wall of the vagina to the posterior half of the space inclosed in the circle of the os uteri will cause thickness of the swelling over the right, and comparative thinness over the left parietal bone, and displacement of the thickest portion of it forwards in the pelvis—that is, in the direction of the right parietal and away from the left parietal bone."

This theory is extremely ingenious, and affords to me the only explanation of the facts described by Naegele, which gives a rational and satisfactory solution of the problem, in conformity with the phenomena which I myself have observed. For its absolute accuracy I cannot vouch; but I cannot help thinking that it is in the main correct, or at least that it points out the direction in which we are to search for truth.

My last argument is one which, while of itself it goes for nothing, is at least admissible as corroborative proof, and is drawn from a consideration of the *cui bono?* No such argument would for a moment stand against a single observed fact, and we have too many instances of this in the history of the subject to permit us to tread otherwise than warily on such dangerous ground. But, after all, we may surely ask what is the use of this alleged obliquity? It is not only said to take place before the head is actually engaged in the brim, but, according to Naegele, is more marked then, and cannot therefore be due to any resistance from the hard parts of the pelvis. But, even if it did not occur till the head experienced the resistance of the brim itself, it is difficult to conceive what mechanical advantage would result therefrom, as there is ample room and to spare in any well-formed pelvis for the bi-parietal measurement of a full-sized fœtal cranium. In the case of the long diameter of the head, we are able, without any difficulty, to assign a cause for the obliquity which causes the occiput to pass in advance of the forehead, but in this case I cannot imagine a single theory which will bear examination for a moment. I can understand how it may exceptionally occur, being rendered necessary by a deformed pelvis, a distended rectum, or some other cause; but I am perfectly convinced that the rule in the vast majority of cases is, that the head enters the pelvis *directly*, in—or nearly in—the axis of the pelvic brim.

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ROBERT MACLEHOSE, PRINTER TO THE UNIVERSITY, GLASGOW.

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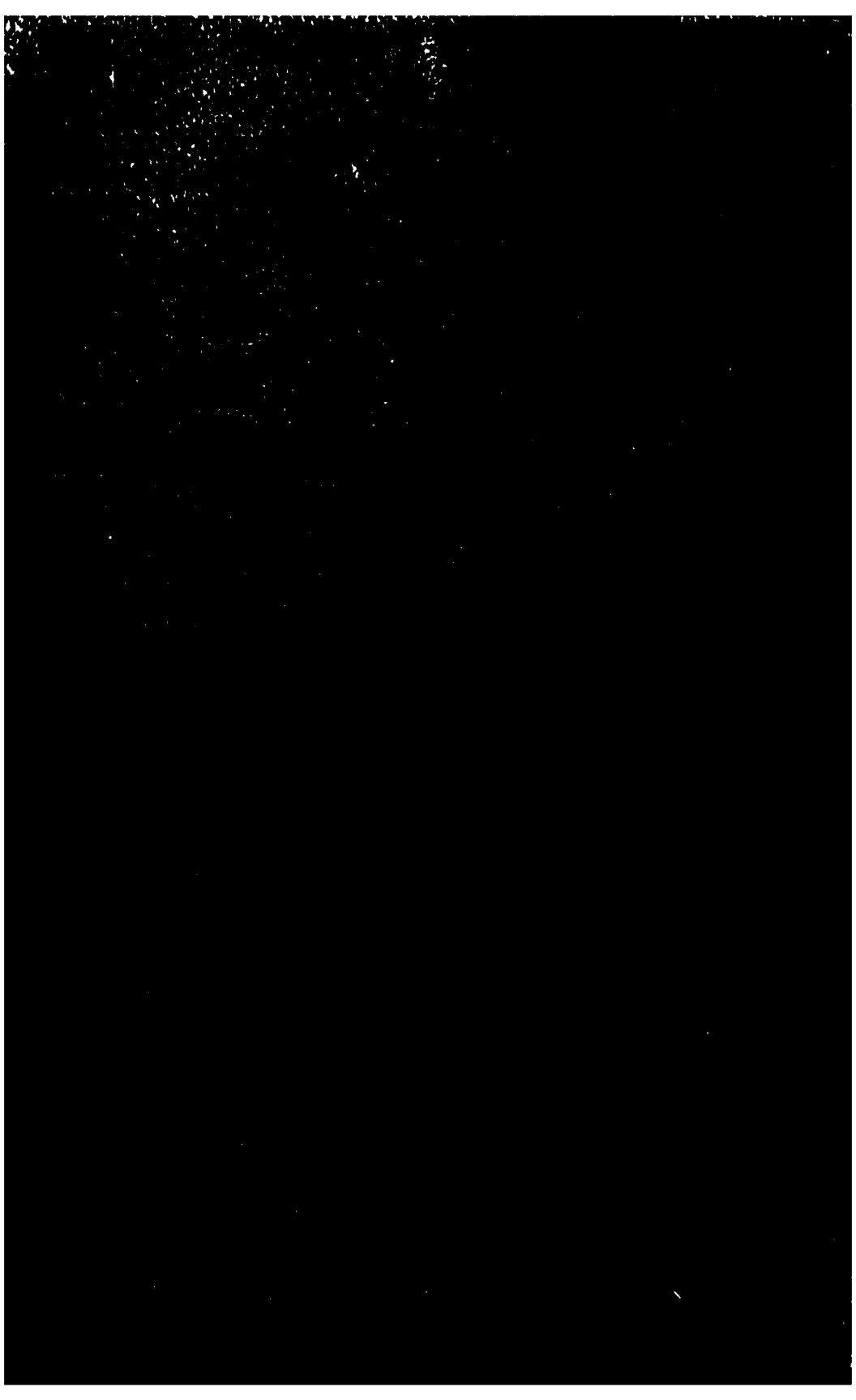
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